THE BRICKBUILDER

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THE BRICKBVILDER

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FILIPPO BRUNELLESCHI

BORN MCCCLXXVII. DIED MCDXLVI. NATIVE OF FLORENCE. ARCHITECT OF THE DOME OF THE CATHEDRAL, PITTI PALACE, PAZZI CHAPEL, AND HOSPITAL OF THE INNOCENTS IN FLORENCE

THE BRICKBVILDER

VOLUME XXV JANUARY, 1916 NUMBER 1

The School Building as a Social Center.

PART II.

By DWIGHT H. PERKINS.

IN the introductory article in the preceding issue there was described certain types of buildings which must be referred to for illustrations of schools especially adapted for neighborhood center purposes.

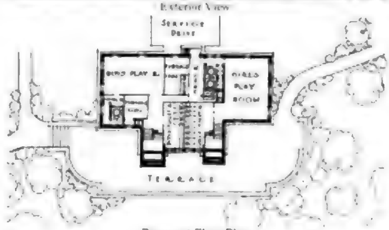
It will be apparent from a study of those types, as well as from a consideration of the subject of this article, that *plans* should constitute the principal material for illustration, and as many of the buildings to be considered have been published previously, no particular emphasis will be made upon exterior design.

There is no new principle of architecture nor marked difference in style or method evolved by such community centers as have been built. Only slight suggestions of original design have appeared as yet. Building processes are unchanged; the subject is chiefly one of plan adaptation. This is not saying that this will always be so. A natural change in architectural expression will probably develop as the expanding demands are met by architects with intelligence and fine feeling, but this article relates to present achievements and not to ultimate results.

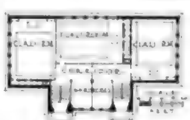
Many schools of ordinary type are being used, more or less, as neighborhood centers. Many of a developed or improved type, in which the assembly halls or gymnasiums have special entrances and separate heating apparatus, are also used for community purposes. They do not come within the limits of this article, however. They are not purposely planned and adapted for neighborhood center purposes, and for that reason they will not be used as illustrations, although many such buildings are interesting architecturally.

California, with its space and sense of bigness, takes the lead in scope of plan, if the two examples here shown are to be regarded as typical. Wisconsin leads in community organization, while Chicago and its suburbs are advanced in the union of schools and playgrounds and in the erection of buildings of moderate size and cost especially adapted for many functions.

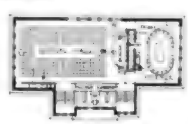
Exterior View



Basement Floor Plan



First Floor Plan



Second Floor Plan

Cordaville School, Southboro, Mass.
Cooper & Bailey, Architects

The Cordaville school at Southboro, Mass., designed by Cooper & Bailey, interests us first. It is the smallest building among those chosen for the purposes of our study and will therefore have wide application to the neighborhood school problems in rural districts. It is a village school. The basement facilities may be used in connection with the playground. The office and the three class rooms, being on the first floor, are in flexible relation to the basement, the yard, the social hall, and the domestic science room. The social hall floor is flat so that when the seats are cleared away an open space is made available. The double stair arrangement gives either the school or the public access to the library and to the social hall or cooking room so that the whole or only a part of the school may be used as circumstances require. The addition of a manual training room and a couple of shower baths would make this quite a complete center.

The Fairmount school at West Orange, N. J., designed by Dillon, McLellan & Beadel, presents an example for a suburban community of a group plan applied to elementary and high school needs combined with community uses.

The plans show three divisions, one for each phase of the work to be done: the teaching of the younger children, the instruction and drill of those of high school age, and the assemblies of children young or old or of adults or neighbors. They are "cross connected"; they can be reached by indoor passages and still may be as completely isolated as if they were to be entirely separate. In addi-

Rear of High School Building

Entrance Front of Fairmount Grade School

Auditorium Building

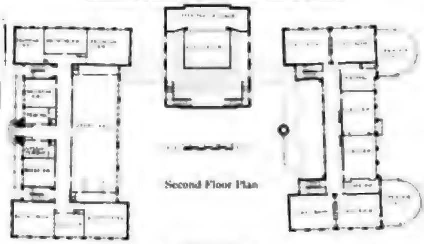
tion the various parts may be united for common instruction or entertainment, as is often done for the purpose of interesting the younger children in the achievements of their older brothers and sisters, and for the further benefit to the elders coming from some knowledge of the doings of their juniors.

The Emerson school at Gary, Ind., designed by Wm. B. Ittner, shows a combination of school and playground which has been found to be of great value to the community. The same idea has been followed by the same people in the case of the Froebel school. In each the buildings and grounds are planned as parts of the complete whole and are so operated. The playground is in use at all times of the day and evening. The children in the playground alternate with those in the school building, one period in and one out, throughout the day and evening. By this method the capacity of each section of the center is doubled.

The large or public features of the building do not vary materially from those in many standard buildings; but inasmuch as this is a community center at all times, daytime and evening, there is little or no need for separate entrances and heating apparatus.

These two schools have been in operation for three years or more — a period long enough to demonstrate that the public does use such facilities when they are provided. These buildings, more than any other with which the author is familiar, show the wisdom of uniting schools and playgrounds under one management; of combining all the grades from kin garten to senior high sc in one center; of providing education and entertainment for adults, and finally of "throwing away the front door key," opening the building for all the people for all purposes all of the time.

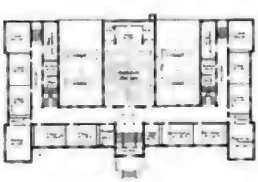
The La Salle-Peru township high school at La Salle, Ill., is an example of combination and management. No drawings are at hand for illustration, but in this case two adjacent cities and the surrounding country districts have united in the construction and maintenance of a high school; to this has been added first a manual training and vocational training building, and second a recreation building with gymna-



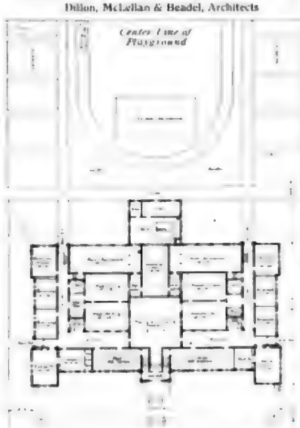
Second Floor Plan

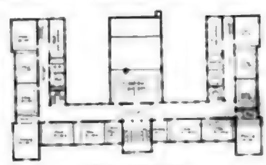
First Floor Plan

West Orange School Group, West Orange, N. J.
Dillon, McLellan & Beadel, Architects



Basement Floor Plan





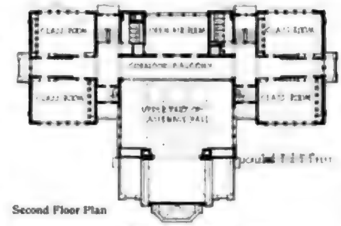
Second Floor Plan

Emerson School, Gary, Ind.
William B. Ittner, Architect

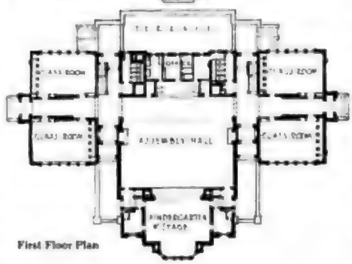
siums, pool, and social rooms of many kinds, all of which are open to the public. These with the surrounding playgrounds make a conspicuous example of a high school group operated to serve many community purposes.

The Oakton school, in District 76, Evanston, Ill., was designed by Perkins, Fellows & Hamilton to meet the usual needs of an elementary school and those of the neighborhood as well. It is the first of three or more units designed to be built at one end of a site of over five acres. This first unit will be extended at either end by the addition of class rooms by which its capacity may be doubled; beyond and further back from the street will be placed the gymnasium building, and in a similar location on the other side will be the building for manual and domestic arts. A large playground extends beyond to a distance of 750 feet from the front street. It is provided with toilet and bathing facilities in the school basement.

There are three other elementary schools in this district. Neighborhood activities are highly organized here. A program for the entire district and for each school is arranged by the local committees and published weekly from the office of the superintendent of schools. Practically every evening the use of the various auditoriums is spoken for; it is either a lecture, a moving picture show, a sociable, a discussion of some current political or municipal subject, a dancing lesson, or an athletic game that one sees in the assembly halls every afternoon or evening.



Second Floor Plan



First Floor Plan

The plan of the Oakton school shows the usual arrangement of class rooms, but the assembly hall, kindergarten, and offices are more prominent than in preceding examples. They may be separately entered and may be cut off from the rest of the building by iron gates without separation from the stairs or toilets. The kindergarten is used as such in the daytime when the curtains are drawn; at other times it is the stage of the assembly hall, the floor being 30 inches above the assembly floor. The kindergarten toilet rooms serve as stage preparation rooms in the evening.

The Edward S. Bragg school at Fond-du-Lac, Wis., by the same architects as the Oakton school, is similar in that it accommodates as many pupils and complies with the same neighborhood requirements, but is very different in size and cost, it having been built for less than two-thirds of the expenditure for the Oakton school.

Extreme economy had to be practised here; therefore the assembly hall was lined with glazed brick and is used for athletic

View of Exterior from Street

View of Kindergarten Looking Toward Assembly Hall

View of Assembly Hall Looking Toward Stage

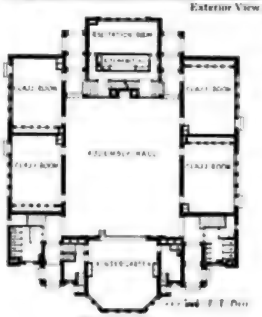
Oakton School, Evanston, Ill.

Perkins, Fellows & Hamilton, Architects

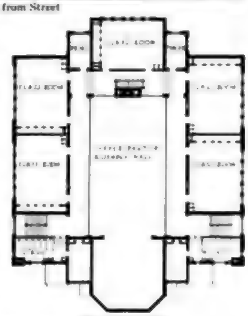
games. The kindergarten-stage combination was employed as in the Oakton school, but the corridors for the second story were built as suspended balconies around three sides of the assembly hall. There is one large fireplace at the rear end of the hall, whereas the assembly room of the Oakton school has one at each side. This room is in the center of the building and extends through two stories with light from above. Notwithstanding the cramped space and limited appropriation, every school and neighborhood need can be met here, although they would naturally be served better if it were possible to avoid having quiet and noisy functions simultaneously.

The Lincolnwood school, District 75, Evanston, Ill., and the public school of Osseo, Wis., are examples of the one-story type of schools adapted for community purposes, of which there are many being built in the Middle West in locations where the cost of land is not prohibitive. The one-story idea, when no basements are constructed, is in itself very economical. The greatest advantage, however, lies in the possibility of overhead light for every room, outside rooms as well as inside, and in the elimination of risk from fire or panic.

Exterior View from Street



First Floor Plan



Second Floor Plan

Bragg School, Fond du Lac, Wis.

The kindergarten stage is the same in the Lincolnwood as in the Oakton school. The assembly room is likewise the exercise room and the connecting space between the two sides of the building. Whenever a teacher wishes to dismiss her pupils without interrupting the meeting in the assembly hall, she dismisses them through the direct outside door, one of which is provided for each center room. The corner rooms are at the principal entrances. The kindergarten is separated by either a curtain or folding doors from the hall. Special entrances from corridor admit kindergartners in the daytime and actors, when dramatics are put on, in the evening. The main corridors can be extended indefinitely to the rear for additional class rooms when needed. The site is an entire block 300 by 550 feet in a heavily-wooded area. A playground is provided at the south of the building.

The arrangement of rooms is shown by the reproduction of the plan. One of the illustrations shows the interior room as it is in daily use; a second illustration shows a neighborhood gathering at Christmas time, the children taking part in a pageant, with their elders looking on from their elevation on the

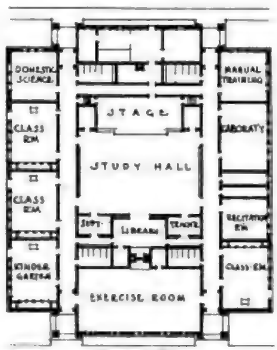
View of Assembly Hall Looking Toward Stairway

View of Assembly Hall Looking Toward Kindergarten

Bragg School, Fond-du-Lac, Wis.
Perkins, Fellows & Hamilton, Architects

stage. The neighborhood seized upon this building as soon as it was opened and has kept the engineer busy ever since. It is not uncommon to see 450 people in this hall, which has come to be used socially, even for private parties as well as for every kind of public meeting.

The plan of the Osseo school differs from that of the Lincolnwood in that it includes high school space with the elementary rooms for a very small village, and further in that the stage-kindergarten combination is not employed. As the community in which the school is located is a farming one, the exercise room is placed near the front doors so that the men who are self-conscious may more easily slip into the building and congregate around the open fire. The library serves a similar purpose for the women.



Main Floor Plan
Public School Building, Osseo, Wis.
Perkins, Fellows & Hamilton, Architects

The New Trier township high school at Kenilworth, Ill., has been built in three sections and there are more to follow. The first section comprising the main central building with the tower was designed by Patton & Miller.

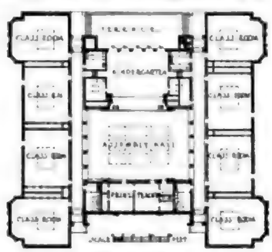
The last section and the alterations in the original building were designed by Perkins, Fellows & Hamilton. The group plan has been used. The central building with its wings is devoted to academic and scientific work; the west units to assembly and luncheon purposes; the east units to physical culture, and the north division to shops and power plant. The dotted lines on the plan show the reservations of space for further building.

This high school is open the year around, and in summer time age limits are ignored. One may see children of kindergarten age in the swimming pool and at other times the fathers and grandfathers of the district swimming under the eye of an expert instructor. The two gymnasiums as well as the shops are also thrown open, under proper instruction, to the citizens in accordance with a resolution passed by the board of education, opening all parts of the buildings and grounds to the public at all times when they will not interfere with the regular work of the high school students.

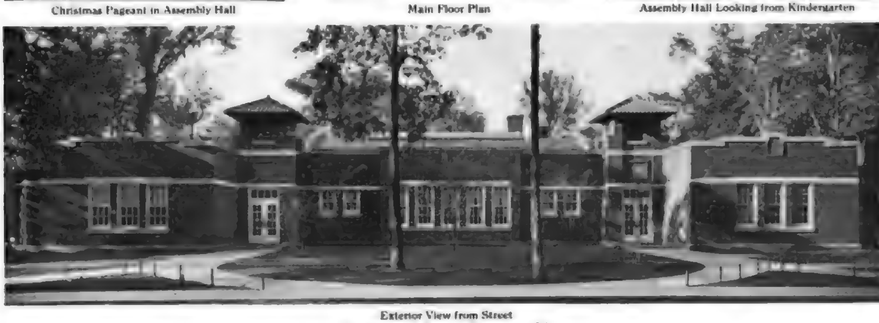
The division most used by the public is the section comprising the assembly and mess halls. The assembly hall seats 1,000 persons in the main part and 200 on the stage. The width of the stage opening may be reduced from 48 feet to 32 feet by swinging partitions built of steel and asbestos and hinged at either side. By this means the stage may be used for dramatic performances, for commencement exercises, or calisthenics exhibitions. When the fireproof doors are swung and the asbestos curtain lowered, the stage is completely separated from the hall and becomes the music room for band, orchestra, and chorus drills and for club sessions and class conferences.

The social home room of the school as well as of the neighborhood is the mess hall, or lunch room. It is lined with pressed brick and finished with antique oak. A large fireplace is at


Christmas Pageant in Assembly Hall


Main Floor Plan


Assembly Hall Looking from Kindergarten

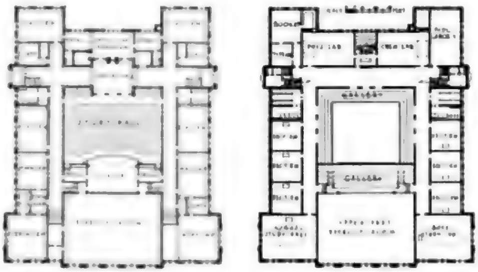

Exterior View from Street
Lincolnwood School, Evanston, Ill.
Perkins, Fellows & Hamilton, Architects

one end, the faculty balcony lunch space at the other end, and along one side the cafeteria counter. Four hundred people may be seated at the tables at one time, yet in a few minutes the tables may be put in storage under the assembly hall stage, thus making the floor clear for dancing. Three double doors at the side of the hall lead directly to the social lunch room so that the two are used together. A lecture in the hall followed by refreshments and dancing in the lunch room is not an infrequent evening occurrence, and even in the daytime the most distracting program or expressive crowd cannot disturb the school sessions in the main building.

The fourteen-acre site constitutes one of the chief features of this school plant. A football field, a four-lap running track, a baseball diamond, seven tennis courts, an exclusive field for girls, experimental gardens, a bit of the original grove, and the forecourt are all features provided for school and public alike.

The St. Joseph high school at St. Joseph, Mich., is designed to comprise as many of the features of the New Trier school as can be given on a restricted area for a small attendance and for a sum about one-fourth of that expendedat Kenilworth. Site and funds compelled a single building of most compact arrangement, which will be satisfactory on the theory that the entire building, rather than separate parts, is to be used as a community center. A study of the plans will reveal the methods adopted for providing for the various school and neighborhood activities.

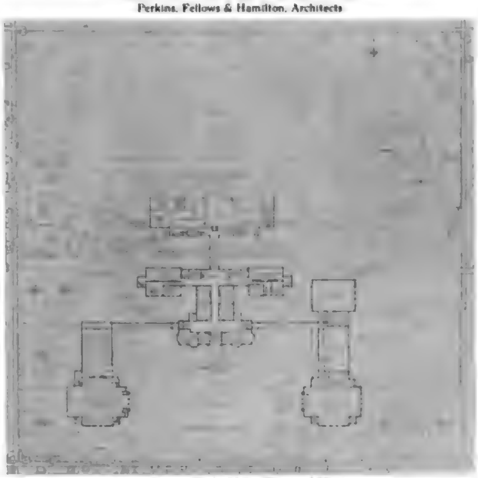
The Emerson school at Oakland, Cal., designed by John Galen Howard and John J. Donovan, and the Oak Park school at Sacramento, Cal., designed by Mr. Donovan, present the most noteworthy examples of modern schoolhouse planning which have come to the author's attention. We understand that they are not exceptional in California, in fact, they are typical there. If this is so, boards of education, educators, and architects must not fail to study these examples if they desire information in regard to the latest



First Floor Plan Second Floor Plan

High School Building, St. Joseph, Mich.

Perkins, Fellows & Hamilton, Architects



General Plan of Main Floor and Plot

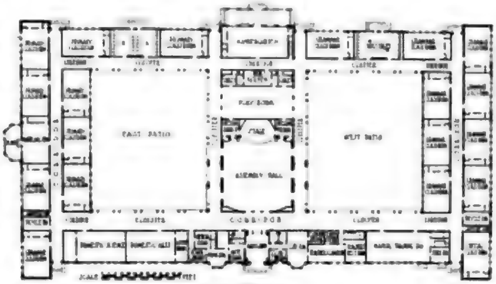
New Trier Township High School, Kenilworth, Ill.

Bird's-eye Perspective View of Buildings and Plot New Trier Township High School, Kenilworth, Ill

Perkins, Fellows & Hamilton, Architects

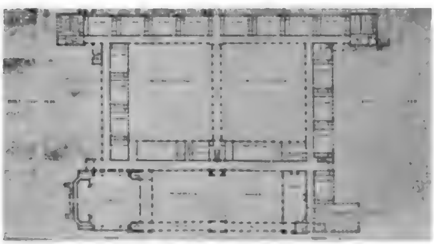
developments in the plan of school buildings and grounds.

Both schools have large sites; each is planned without limit of property boundaries. Each includes facilities for all or most of the functions which we have found in the other examples mentioned in this article and in the preliminary statement which we made of the requirements of a modern school. The Oakland school has such advantages as pertain to the one-story scheme, although, being under California sunshine, the architect has probably considered it unwise to use overhead light. The Sacramento school gives better separation to the public portions; the assembly hall and library have special entrances which the author considers an advantage. It is believed also that separate kindergarten access is advisable. A novel feature is included in the Sacramento building; it is the "upstairs" playground. Presumably it is to provide outdoor play space when too much sunshine and heat as well as the heavy downpours of that country make the earth's surface undesirable for play. One can easily imagine the use of the large courts for pageantry which a progressive teacher would inaugurate, and no imagination at all is required to conceive of the many uses which a guided public could and probably does make of these structures.

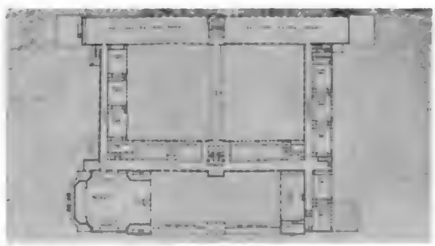


Main Floor Plan
Emerson School, Oakland, Cal.
John J. Donovan, Supervising Architect. John Galen Howard, Associate Architect

In conclusion, the author would state as his opinion that there are no schools, including even the best which have been selected for the illustrations of this article that are planned with the main purpose of adapting them to the uses of neighborhood centers. Instead, we find an encouraging number of good schools. These, as was stated in the introduction, automatically become good neighborhood or community centers because they are modern and are skilfully planned. This after all is, the author believes, the best way to arrive at the desired result, because it links the center with the most permanent and deeply rooted civic institution yet conceived, namely, the public school.



First Floor Plan



Second Floor Plan

Bird's-eye Perspective View
Oak Park School, Sacramento, Cal.
John J. Donovan, Architect

Diagrammatic Progress Schedules.

By CHARLES A. WHITTEMORE.

THE difference between the practice of architecture to-day and fifty years ago is as great as the difference between the building methods of the same periods. Each new material or appliance renders the problem more complex and, in addition to a new adaptation of the principles of design, requires new business methods on the part of the architect as well as the builder. The architects and builders have in a large measure kept abreast of the times; but in some particulars the methods used to-day are the methods of the dead past. The architects, as a rule, will much more readily adopt a new type of architectural treatment than a new idea in business administration, and many think that a systematic, businesslike office is incompatible with the free, untrammeled spirit of the profession. A more erroneous idea would be difficult to conceive. Business methods have so radically changed and the status of the architect, in relation to the owner and builder, is so widely different that each architect must daily face problems of which his predecessors knew nothing.

In the construction of a modern building whether it be a residence or an office building, the architect is spending not his own money but that of a client. It is, therefore, necessary that he spend it wisely and that he eliminate all unnecessary expenditures. To do this requires attention to detail, investigation of materials, and the power to deliver results. In order to follow the intricacies of an architect's work, it is essential that he be systematic and that he organize his office force along systematic, coherent lines.

No office system which does not become an efficient servant is worthy of consideration, and a system which imposes multiplicity of detail is worse than useless. The fact remains, however, that a certain amount of system and routine records absolutely must be maintained in order to correctly and intelligently supervise and control the commissions at hand and to properly protect the client's interest.

No architect's office can be reduced to the terms and conditions of a factory, and that office which, without being subservient to it, maintains an effective and intelligent system of office record, is in an enviable position.

With all the progress in other departments of the work, the building superintendence has shown less of the systematic spirit than the drafting room. A simple daily or weekly report does not suffice unless it is verbose and full of detail. A superintendent's report to be worthy of the name should be complete without undue length, and should be of such a character as to enable the architect to visualize the conditions at the building without the necessity of a personal investigation. The exact material contained in the report would of necessity vary with the kind of building, but in each element of constructive work the report should indicate relative progress. Some offices check weather, temperature, number of workmen on various parts of the work, etc., but few carry along a concise graphic record of the building progress, although this is of vital importance.

So it is with the contractor. It is essential that he should have a graphic check on the performance of his workmen and sub-contractors. He must know at once if there is a "slowing up" on the labor, if there is a likelihood of delay in delivery of material. The most effective method of "nipping in the bud" the tendency to retard the progress of the building is by a graphic diagram. Some contractors make an effort at program schedule, but few have a careful progress schedule. The difference between these is the difference between "promise" and "performances," the difference between "we agree" and "we did." To eliminate this condition, which might be quite troublesome at times, the progress schedule presents itself as of especial value.

Diagrammatic progress schedules present a graphic detailed description of the progress of construction of a building under consideration. The importance of such a progress schedule has possibly been overlooked to some extent. This is evidenced by the fact that there is no established uniform progress schedule in common use among the various professions and trades interested in building construction.

This may possibly be due also to the fact that each individual office conducts its affairs along different lines, and it may be that a standard form of progress schedule would not be advisable.

Some of the larger offices in this country which have already adopted the progress schedules have adopted them because of the value which the schedules have demonstrated in assisting in the solving of problems after the completion of the work, as well as in the increased efficiency of the superintendence.

The importance of a progress schedule will be obvious upon investigation. From the time of signing the contract for a building through the process of demolition, excavation, foundation work, and through the various building stages, up to the time that the last shade is hung in the building or the last brushful of paint applied, the progress schedule is a continual, visible reminder of the relation of the status of the work at any one time to the condition the work should be in in order to have the building completed in accordance with the prearranged contract.

The effect of the progress schedule in regulating the work of the contractor so that the building may be completed "on time" is in itself a sufficient warrant for its existence, and a detailed description of the exact working out of the progress schedule in relation to possible delays will be given to substantiate this contention.

The progress schedule is not confined in its usefulness alone to the architect or to the contractor, but is equally valuable to the sub-contractors, material men, foundry men, mill men, and all whose efforts are toward the completion of a building. It is also a valuable guide to the owner.

No standardized form has yet been devised which would be suitable to all branches of the contractor's organization, since the materials and workings of the various sub-contractors differ so widely. The same underlying principle,

however, follows through each schedule and is uniform for all various trades. Illustration of the method of working out a progress schedule and the application to foundry, mill, and shop will be given later, and while these are not taken from actual schedules, the principle will be obvious.

Where each contractor and sub-contractor is interested in employing and in operating the progress schedule, there is no doubt but that the various portions of the work are kept under better control, and each contractor endeavors to so execute the work entrusted to his care that there shall be no question about his ability to live up to his promises in the performance of his work. Each sub-contractor also, knowing that the general contractor has a check on his work, will see to it with far greater care that his work is installed quickly, efficiently, and promptly, so that the general contractor will have no possibility of a claim for delay by virtue of lack of proper installation or lack of installation at the proper time. The general contractor also, knowing that the architect and the owners are keeping an accurate record of his work by means of the progress schedule, will use every effort, possibly to a degree beyond the ordinary, in maintaining the status of his work at the point to which it should be maintained in accordance with the prearranged schedule.

The importance of a progress schedule is emphasized in the construction of buildings in crowded portions of the city or on streets where traffic regulations impose special restrictions as to blockading traffic or stopping teams. Here problems must be solved which are not encountered in any other locality, and on thoroughfares of this character it is so important to conduct the work in such a manner that traffic will not be disturbed, that extraordinary precautions and considerations must be taken into account to avoid this necessity.

It is here that the efficiency of the modern builder is shown to perhaps the greatest advantage; it is here that one can make or mar the construction of the building along scientific and economical lines, and it is here that the various builders differ greatly in submitting their estimates, some builders having been particularly familiar with this kind of work, others approaching a problem of this character possibly for the first time.

In such locations a progress schedule is not only advisable but is imperative, and any attempt to conduct a building operation without some such method would have disastrous results. The building wrecker must begin the program by arranging to have teams at the site at the right minute to receive the débris which is to be carted away. The riggers for derricks and for constructional work of a like character must be at the building at just the proper time to erect their derricks. If the derricks arrive too soon, the property is encumbered and delay is the result; if they arrive too late, workmen who are depending upon their installation are standing around with idle hands.

When the excavation is commenced, teams are arranged according to the program to arrive at certain times. Large chutes are constructed, which contain a certain amount of material. A team drives in under the chute; the gates are opened; the team filled; the gates are closed and everything is ready for the next team. In this manner a continuous stream of teams can be loaded without in any wise disturbing the traffic.

When cement, stone, sand, etc., are required for foundation work, the exact time of their arrival is determined in advance, and the teams are on the site with their stone, sand, cement, or whatever is required, at the right time for it to be used without unnecessary delay or without the necessity of storage on the property.

The erection of the steel is carried along in the same manner. The column bases are delivered at a certain time. The first length of columns and the first floor beams are delivered at a certain date, and deliveries are arranged a certain number of days apart for all the other columns and beams throughout the building, the exact interval between deliveries depending upon the time required to erect the various stories.

Very frequently the masonry is commenced before the steel work is entirely finished, and in some instances buildings have been constructed where the mason work of the exterior walls was started at four elevations at the same time. It is obvious that the brick and cement and mortar must all be delivered in accordance with the prearranged program, otherwise the property would be so encumbered that no other construction could be carried on until such time as the masons had completed their work.

So it is with the material for the floors, with the blocks, etc., for interior partitions, with the plastering, carpenter work, and until the final finish coat of paint has been applied; at the same time the plumber, steamfitter, electrician, and other mechanics of a like character carry on their work, the program having been predetermined and their work laid out so as not to be in advance of the other construction nor yet behind so as to cause a delay, but to maintain the same speed throughout the entire operation as that of the other contractors.

Before commencing work the contractor, in consultation with the architect, arranges a graphic schedule of the dates and duration of his work, as well as of each subcontract coming under his control. Under such conditions the relation between the schedule and the actual work may be checked from day to day.

Delays are bound to occur at various stages of the work, many times due to conditions beyond the control of the general contractor. A schedule of this nature, however, serves as a continual watchman on the operation and tends to check delays in their incipiency.

The value of the progress schedule in case of unavoidable delay or unintentional delay on the part of the contractor is almost inestimable. Reference to this record shows at once whether the excavation were prosecuted in the best possible manner and without delay. If a delay occurs in the excavation, both the cause and the delay are at once apparent and also weather conditions which may be responsible for this delay and in which case the liability of the contractor would cease.

If, on the other hand, the excavation and foundation work proceed in due course with proper speed and there is a delay in setting steel work, this record shows at a glance whether or not the fault is in the delivery of the steel, and if so whether the fault is in the mill work or drafting room work, and the responsibility for the delay may be properly placed.

If, on the other hand, the general tendency is evidenced from the commencement of the work until the time of completion of a gradual lagging behind the prearranged

schedule, it demonstrates beyond reasonable doubt that the contractor is either working under obvious disadvantages or else is not competent to execute a contract of this character. If the former assumption be correct, then the responsibility for disadvantages under which the contractor is working may readily be placed.

In this way it is possible for the owners of a building to predict the date of completion to such an extent that tenants may be engaged and leases drawn up with but very little chance of the necessity of revising these dates of completion and occupancy.

The progress schedule then becomes an inanimate arbitrator of disagreements as to delays between the contractor, the owner, and the architect and, assuming the records to be correctly kept, is an arbitrator whose decision cannot be gainsaid.

There are two types of diagrammatic progress schedules in use. Advantages are claimed for each type and it is a question which best fits the personal use rather than which is the better type.

One type is on cross section paper in which the horizontal lines represent the different materials. The vertical lines represent the extent of work, while the heavy subdivisions of vertical lines represent months or weeks as the case may be. In using a schedule of this character a straight horizontal line is drawn opposite the subdivision of the contract in the case of the general contractor, showing the starting time and the finishing time. The straight line drawn between these points passing the vertical divisions represents the proportionate part of the contract which will be completed at certain dates. A cut of this type will be given in a later article.

In another type concentric circles represent proportion of work accomplished while radial lines represent month and week divisions. In this type of schedule the relative progress of the work is much more clearly shown than in the former type, in that any departure from the time, which in this case is a parabola rather than a straight line, shows to quicker and better advantage. An advantage of this particular type is that any small subdivision of contract or any new sub-contracts can be added without increasing the size of the schedule, while in the first type, as must be obvious, the addition of various contracts or sub-contracts would mean an addition of so many lines.

Another distinct advantage which this type has over the other type is that proportionate work and relative speed are so much more clearly shown; for example, if the excavation is to start on the first of May and is to be completed on the first of August, assuming a regular rate of progress, a definite proportion is already established for the amount of work to be done during each week. If, then, this contract is illustrated by a straight line and the progress record is illustrated by a parallel straight line, there is little chance of checking over the rate of progress and the actual proportion of work done during a particular interval.

The question may arise as to the value of this feature, but upon investigation it will be clearly shown that by the progress rate and proportion of work done, one can at a glance check a possible delay. This matter will be further discussed in the article in which the cuts of the different types of progress schedules are given, but from the actual experience of working out and working with progress schedules the point above mentioned has been of great value.

The two types above mentioned are not necessarily the only types of progress schedule which are available, but represent the result of considerable study on the part of contractors and architects. The important feature in any progress schedule is not the exact form nor the exact method of recording the progress; but the first consideration in making a progress schedule should be that the progress schedule shall be easy to maintain, that it shall not require any special effort, and that it may show at a glance the details of progress of the building.

In one office where a progress schedule is maintained, the superintendents visit the various buildings and at a stated time during the day report at the office, or, if the building is out of town, make a daily written report and dictate a résumé of the general conditions of the building. At the same time the progress schedule is extended according as the work has advanced from the date of the last report.

It is not, however, advisable in any instance to endeavor to subdivide a progress schedule into units smaller than weekly units except in special and specific cases, so that in conducting a progress schedule record the superintendent indicates by a dot in the correct relative position the progress of the work from day to day, and by a line through these dots the respective weekly work.

In this manner it is possible to keep the progress schedule up to date without devoting to it more than a few minutes at a time, and without any special office work.

In any large contracting firm, or any large sub-contracting firm, or any large architect's office, there is one man in the office, as a rule, who is vitally interested in the progress of the building and who seldom has an opportunity by personal investigation to see the actual condition of the work on the site. To him, therefore, a progress schedule is of vital importance and it must be a schedule of a character that will not require a great deal of time in figuring out from calculation the status of the work.

The progress schedule has been found of great assistance in checking over contractors' requisitions for payment. Usually a contractor on the first of the month sends in a statement to the architect of the amount of work completed or installed on the site during the preceding thirty days. The architects in examining this approximate in their own minds the relative proportion of the work completed, and as a rule the amount of money necessary to complete the remaining portion of the work. This is at times quite difficult to do. With a progress schedule, however, one can tell at a glance the amount of work completed during the preceding month and calculate the total proportion of the work done to the amount of money involved, with a high degree of accuracy. By having the contractors agree to the progress schedule report which the architect maintains, there is likely to be no disagreement on the amount of money allowed on contractors' requisitions.

A further discussion will be given of the direct merits of the different types of progress schedules and their applicability to the uses of the contractor, sub-contractor, architect, and owners, and outlines will be shown along which lines the general principle of progress schedules would ordinarily proceed.

Fireplaces in an Old English Castle.

By J. W. OVEREND.

FROM the standpoint of the architect interested in the appropriate use of local materials, England is a wonderful country from the fact that it has from time to time adopted the materials for building according to the geological character of particular districts; hence we find in some localities the buildings are of stone, in another of open timber and rough cast, while in a great many cases brick has been, and still is, the chief medium used for construction. One of the finest examples of ancient brickwork is Tattershall Castle in Lincolnshire, England, which has been recently restored, due to the efforts of Lord Curzon, who has thus saved this building for the pleasure and instruction of future generations.

The part of the castle now remaining is the keep, a massive brick building of charming and exquisite workmanship, rectangular in plan, measuring externally 61 by 48 feet, with an octagonal tower at each of the angles 118 feet in height. It is divided into four stories, reached from the ground by a circular stone staircase. The whole building is most substantially built of red brick, with stone heads to the doors and windows. The external faces of the walls are relieved by patterns of black bricks in various designs. As in all old English castles, the walls are of tremendous thickness, some portions measuring more than 15 feet in depth, as may be seen in the illustration showing arches on each side of the fireplace on page 12. The chambers in three of the towers are vaulted in brick and are lighted by small windows, while a passage in the east wall of the second story extends the full length of the building and is vaulted in the most perfect style.

No article on the castle at Tattershall would be complete without a reference to its glorious fireplaces. They are carefully bonded into the brickwork, and in order to preserve the alignment of the beautifully carved lintels over each there was built a relieving arch to take the weight and distribute the pressure of the massive brickwork above. Many of the fireplaces in the old halls and homesteads of England are charming and Tattershall Castle contains examples of the finest. These chimneypieces are most elaborate on the ground floor, being very rich in detail, and while the others are in no sense less beautiful, they are much plainer. The stone and brick in the fireplaces have bonded together perfectly and have kept the whole intact during the four centuries through which the castle has stood.

One of the finest of the elaborately carved stone fireplaces is shown on page 12. It is located on the ground floor and shows the influence of the French Gothic in its detail. It is ornamented alternately with the arms of the various families connected with the history of the castle and treasury purses bearing the motto, "Nay je droit."

In the illustration of another fireplace, the stone carvings of which are in the best state of preservation, the holes in the brickwork immediately below the level of the fireplace are pockets which carried two timber girders for the floor, that had fallen away at the time this photograph was taken.

The castle was built in 1440. Its grandeur and strength have come down to the present age through nearly five centuries but little impaired. During the last three years the work of restoration has proceeded and is now complete; the two moats surrounding it which had been filled in have been re-excavated and, with the building itself, restored to their original condition. The whole presents a unique example of domestic and military architecture of the early fifteenth century.

Two Fireplaces in Tattershall Castle, Lincolnshire, England

TWO FIREPLACES IN TATTERSHALL CASTLE, LINCOLNSHIRE, ENGLAND

BUILT IN 1440

THE BRICKBVILDER COLLECTION.

EARLY AMERICAN ARCHITECTURAL DETAILS.

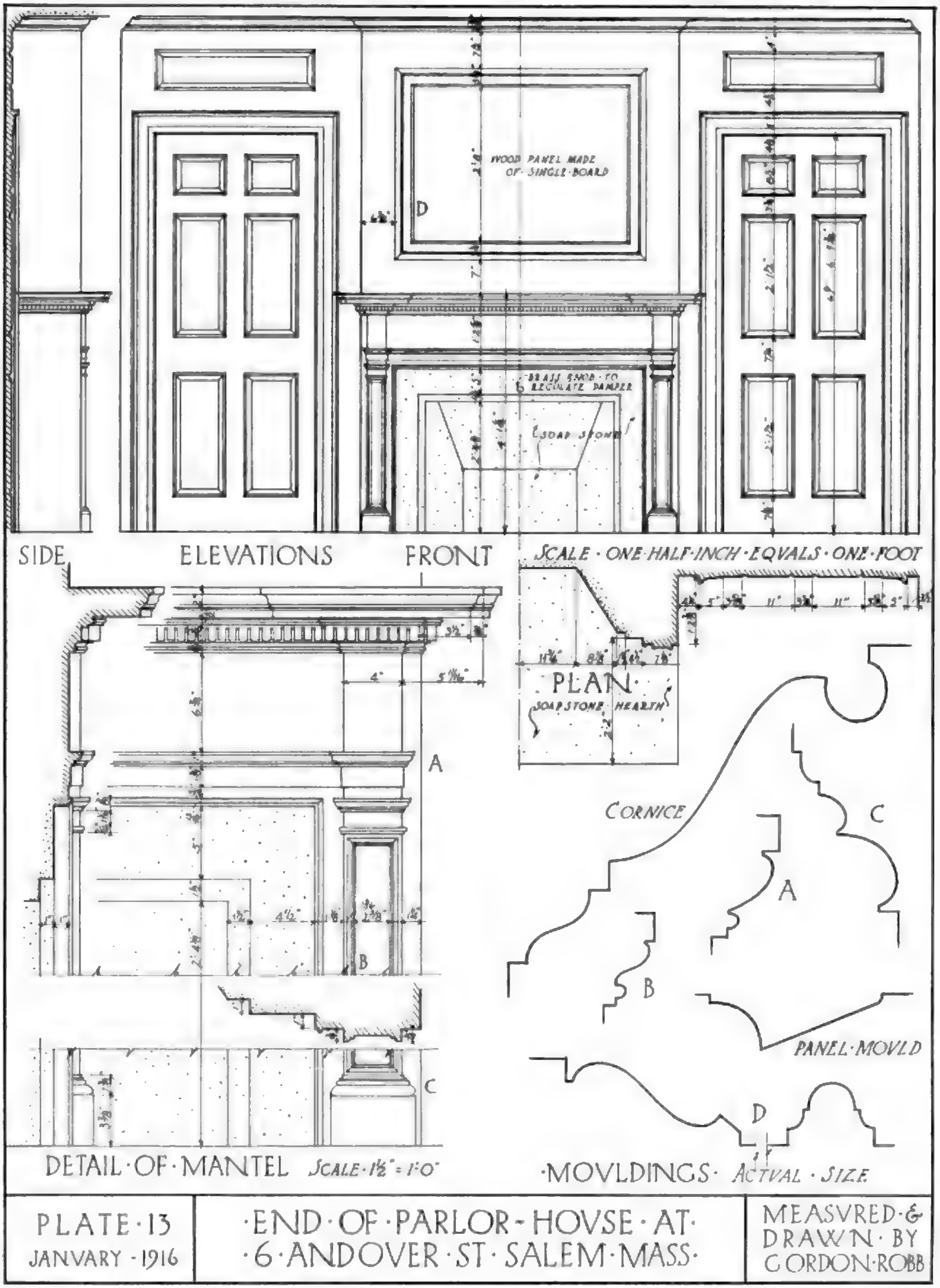
PLATE THIRTEEN.

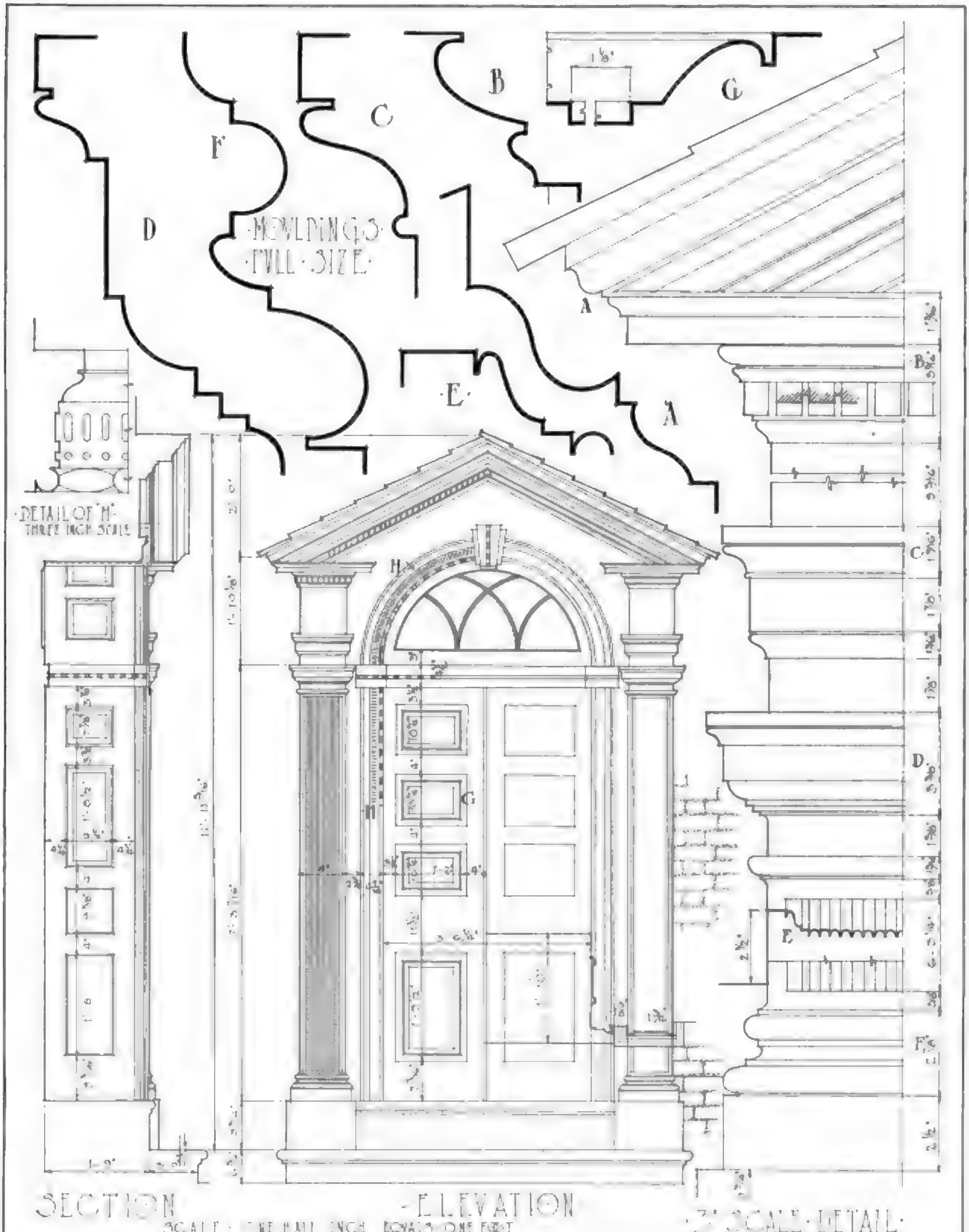
THE interest in this interior lies mainly in the fine proportion of the paneling and in the simplicity and restraint of the mantel. The color of the soapstone which was used for the facing of the fireplace as well as for the fire back, sides, and hearth is unusually rich in its contrast with the pure white of the woodwork. All of the woodwork is of pine, the large panel in the overmantel being of one solid piece. The fact that the rail over this panel is wider than the one below is probably due to a settling of the whole work rather than to any intention on the part of the designer. The cornice moulding is very interesting in profile and takes its place well as a capping to the woodwork below. The filling in of the spaces above the doors with panels of Georgian character adds greatly to the distinguished appearance of the wall and leads one to place the date of the construction of the room in the latter half of the eighteenth century, although the mantel might be considered of later date. The name of the architect or builder is unknown.

END OF PARLOR,

HOUSE AT 6 ANDOVER STREET, SALEM, MASS.

MEASURED DRAWING ON FOLLOWING PAGE.


WOOD PANEL MADE OF SINGLE BOARD
BRASS KNOB TO REGULATE DAMPER
SOAP STONE
SIDE ELEVATIONS FRONT
SCALE · ONE HALF INCH EQVALS · ONE FOOT
PLAN
SOAPSTONE HEARTH
CORNICE
A
B
C
D
PANEL · MOVLD
DETAIL · OF · MANTEL SCALE · 1½" = 1'0"
· MOVLDINGS · ACTVAL · SIZE
PLATE · 13
JANVARY · 1916
· END · OF · PARLOR - HOVSE · AT ·
· 6 · ANDOVER · ST · SALEM · MASS ·
MEASVRED · &
DRAWN · BY
GORDON · ROBB



PLATE·14 JANVARY·1916	DOORWAY - ROBINSON HOVSE ALEXANDRIA - VA ·DATE -1796 · ·ARCHT·VNKNOWN·	·MEASVRED & DRAWN BY· J·L·KEISTER ·O·J· MVNSON & J·A·WEBER·

PLATE FOURTEEN.

THIS charming doorway is a good example of the fine early work to be found in Alexandria. The panels of the pilasters are filled with small vertical reeds which give an interesting surface, while the delicately carved detail of the architrave gives an added charm of fine shadows. The cover boards over the pediment are cut to imitate the effect of shingles. Built in 1796, both the brickwork and the woodwork are in an excellent state of preservation. The form of the lower step indicates that originally an iron rail on either side was part of the scheme.

DOORWAY, ROBINSON HOUSE, ALEXANDRIA, VA.

MEASURED DRAWING ON PRECEDING PAGE.

ADMINISTRATION AND RECITATION BUILDING
MARYLAND STATE NORMAL SCHOOL, TOWSON, MD.
PARKER, THOMAS & RICE, ARCHITECTS

VIEW OF REAR SHOWING AUDITORIUM WING

BASEMENT FLOOR PLAN

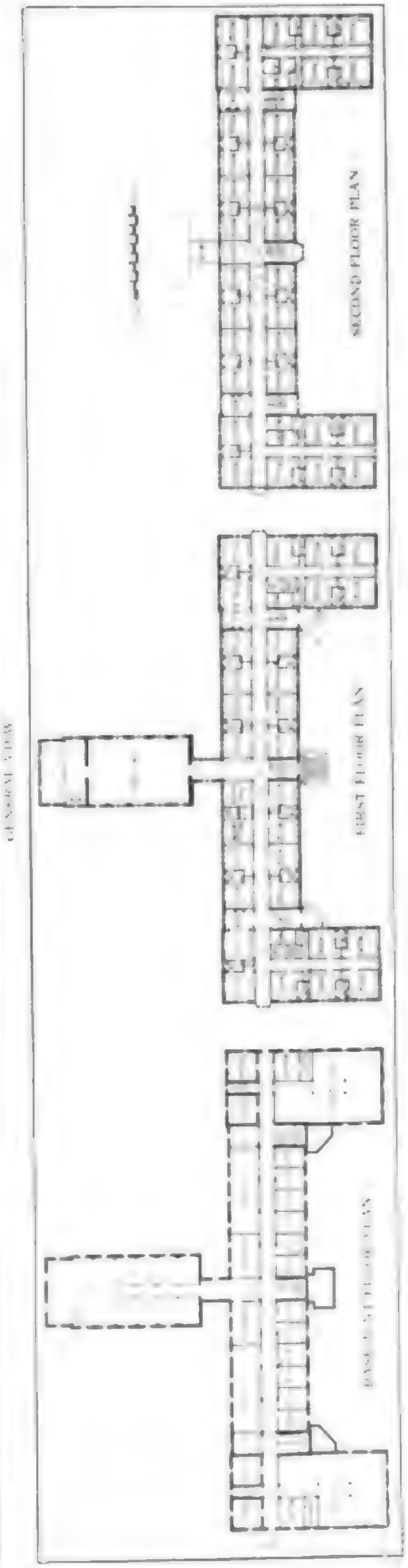
DETAIL OF END WING

ADMINISTRATION AND RECITATION BUILDING

MARYLAND STATE NORMAL SCHOOL, TOWSON, MD.

PARKER, THOMAS & RICE, ARCHITECTS

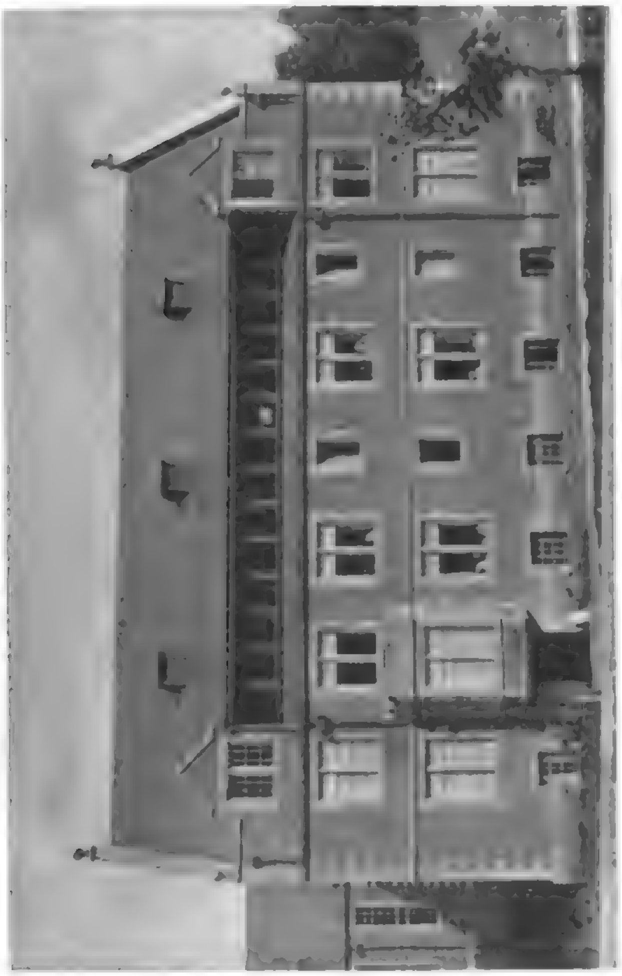
GENERAL VIEW



DORMITORY BUILDING

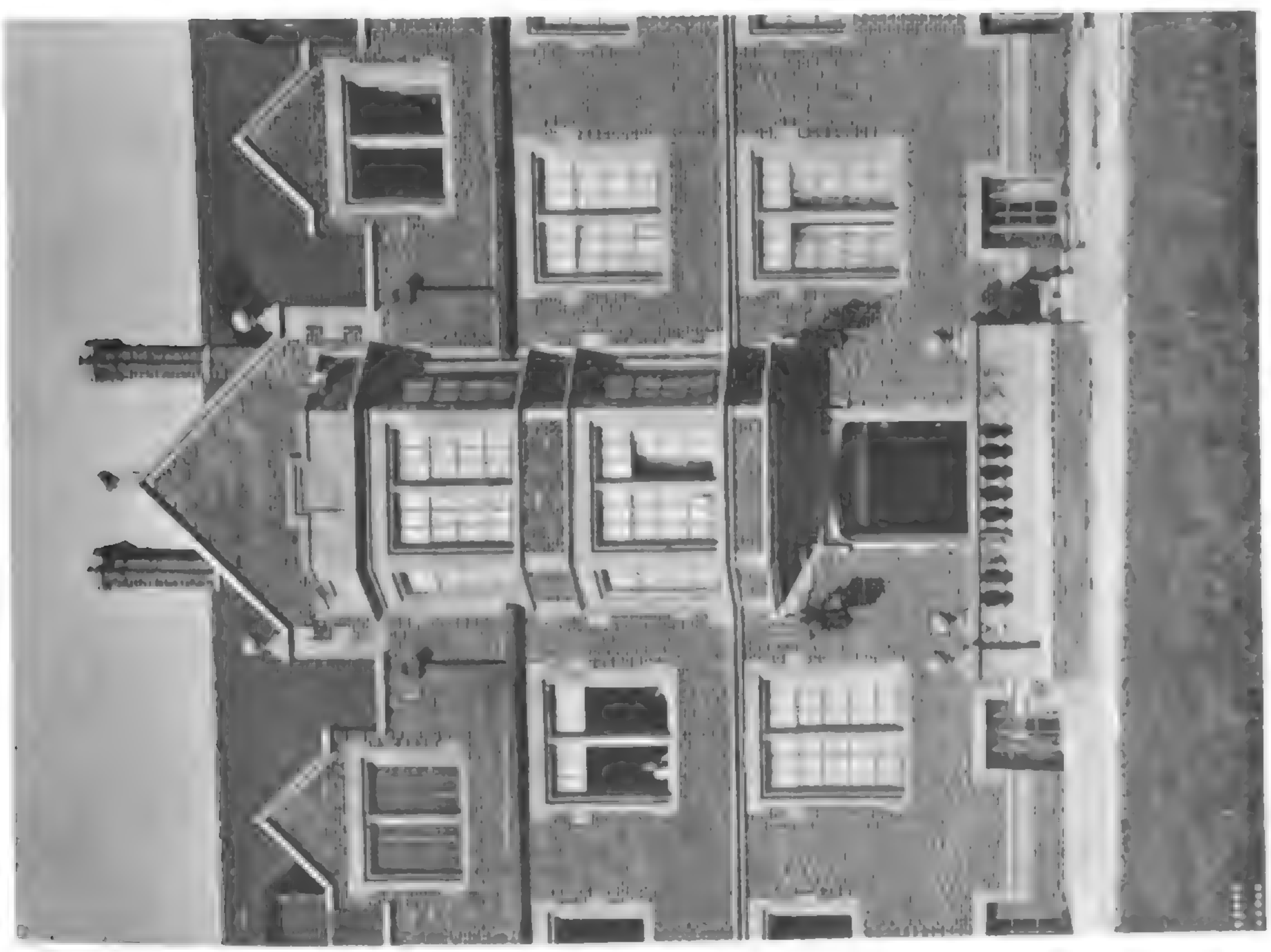
MARYLAND STATE NORMAL SCHOOL, TOWSON, MD.

PARKER, THOMAS & RICE, ARCHITECTS



SIDE VIEW OF END WING

VIEW OF REAR SHOWING DINING HALL WING



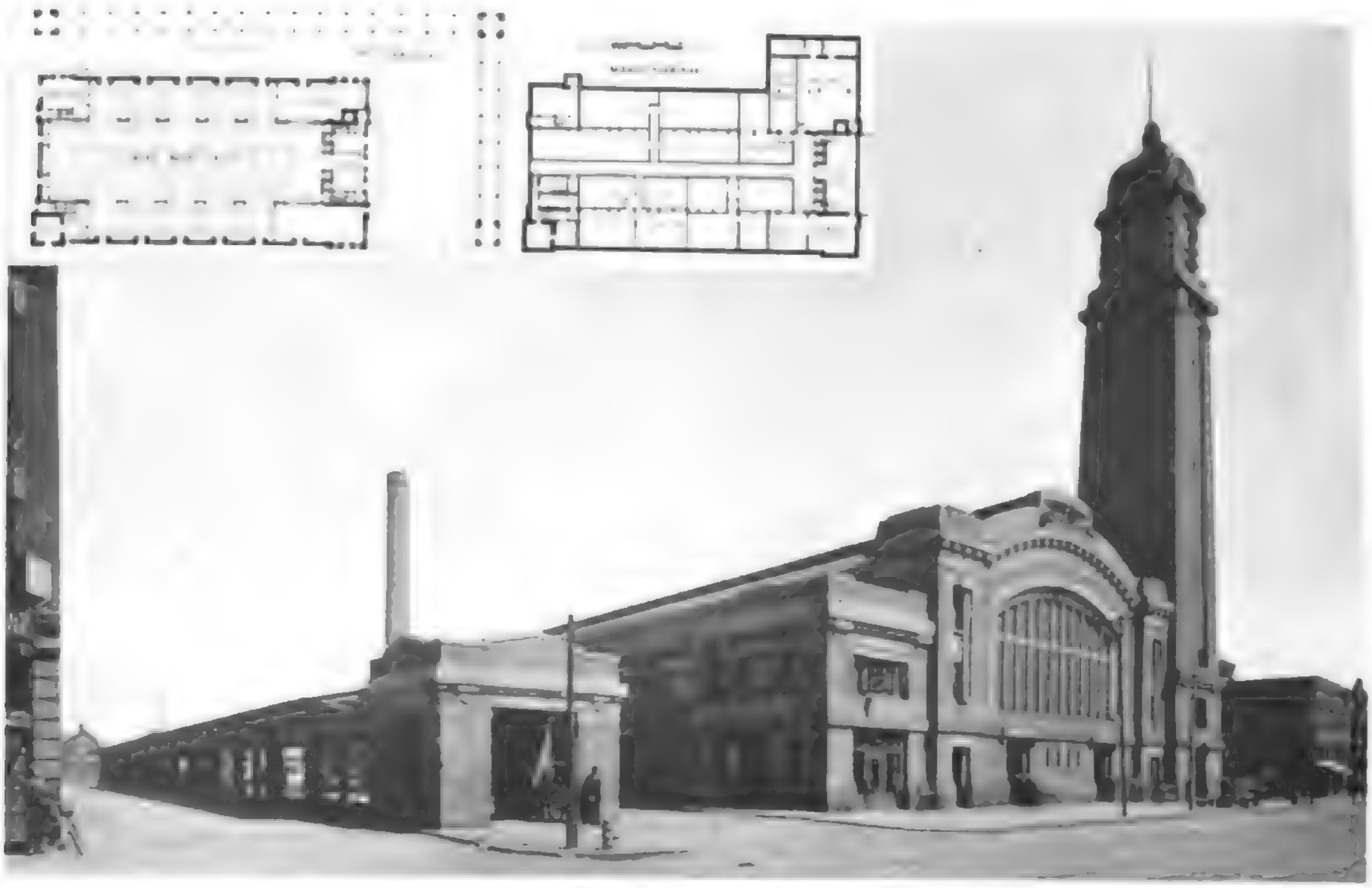
VIEW OF ENTRANCE BAY

DORMITORY BUILDING

MARYLAND STATE NORMAL SCHOOL, TOWSON, MD.

PARKER, THOMAS & RICE, ARCHITECTS

WEST SIDE MARKET HOUSE, CLEVELAND, OHIO
HUBBELL & BENES, ARCHITECTS

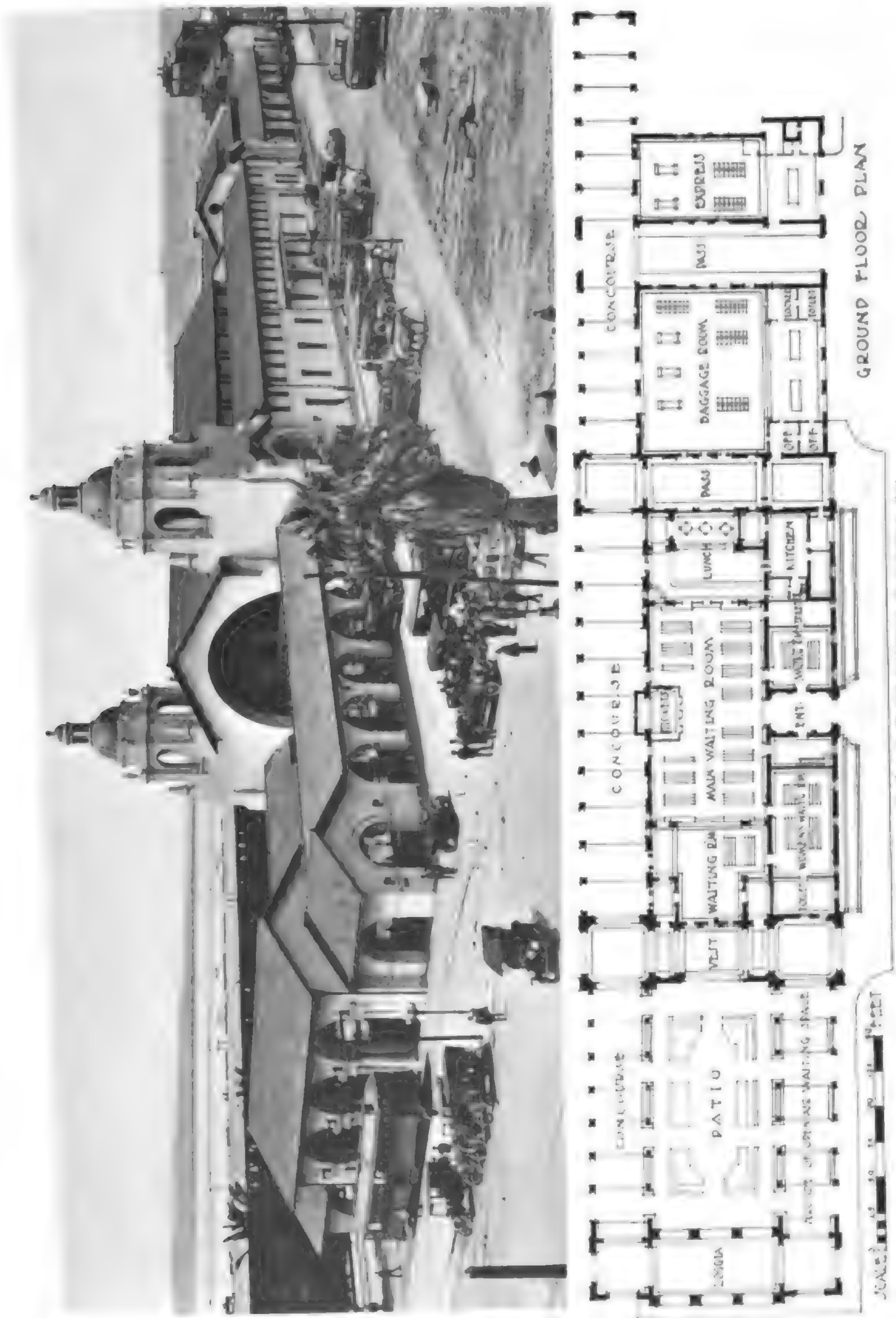


GENERAL VIEW SHOWING SHED MARKET

DETAIL OF PRINCIPAL FACADE

WEST SIDE MARKET HOUSE, CLEVELAND, OHIO

HUBBELL & BENES, ARCHITECTS



SANTA FE RAILROAD STATION, SAN DIEGO, CAL.
BAKEWELL & BROWN, ARCHITECTS.

VIEW FROM PATIO LOOKING TOWARD MAIN ENTRANCE

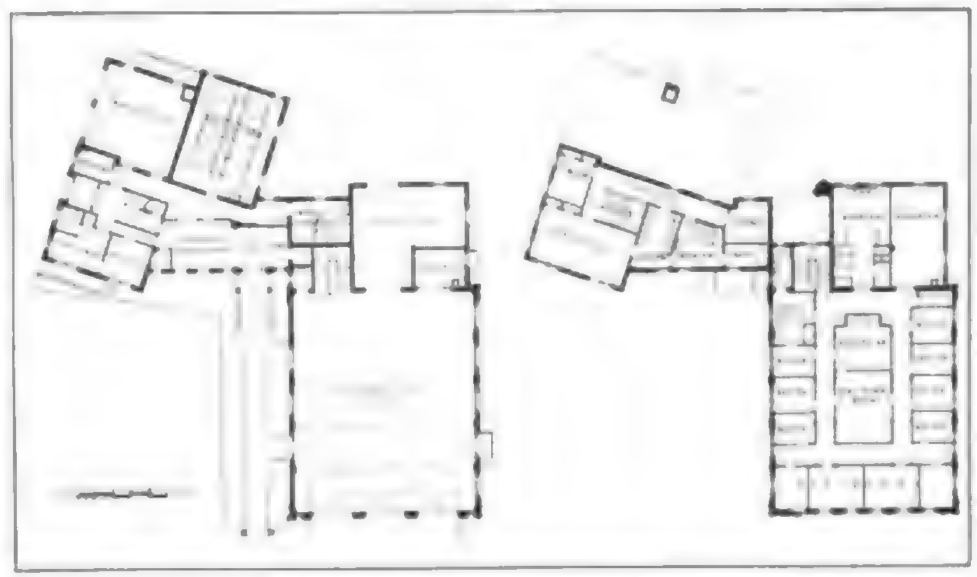
INTERIOR OF MAIN WAITING ROOM

SANTA FÉ RAILROAD STATION, SAN DIEGO, CAL.

BAKEWELL & BROWN, ARCHITECTS

VIEW OF FIRE STATION

VIEW SHOWING POLICE STATION



FIRST FLOOR PLAN

SECOND FLOOR PLAN

BUILDING FOR THE FIRE AND POLICE DEPARTMENTS, WINCHESTER, MASS.

EDWARD R. WAIT, ARCHITECT

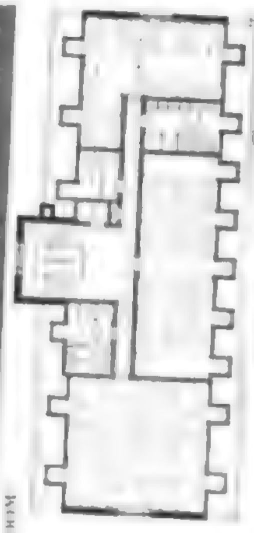
SECOND FLOOR PLAN

FIRST FLOOR PLAN

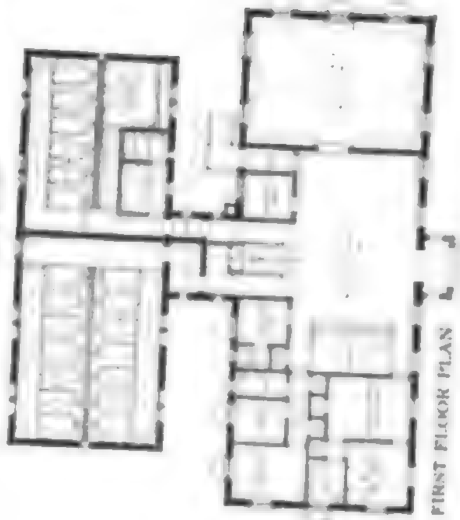
FIRE STATION, WATERTOWN, MASS.
CURTIS W. BIXBY, ARCHITECT

POLICE HEADQUARTERS BUILDING, MOUNT VERNON, N. Y.
GEORGE M. BARTLETT, ARCHITECT

MUSTER ROOM



THIRD FLOOR PLAN



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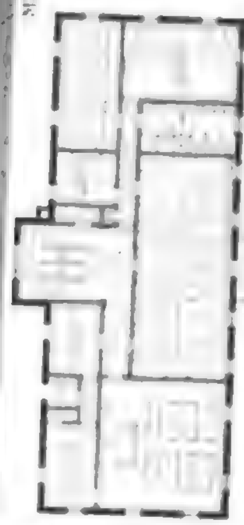
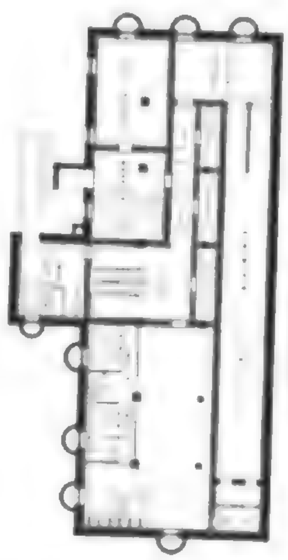


SECOND FLOOR PLAN



BASEMENT FLOOR PLAN

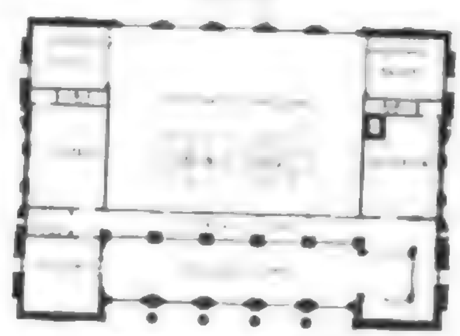
POLICE HEADQUARTERS BUILDING, MOUNT VERNON, N. Y.

GEORGE N. BARTLETT, ARCHITECT

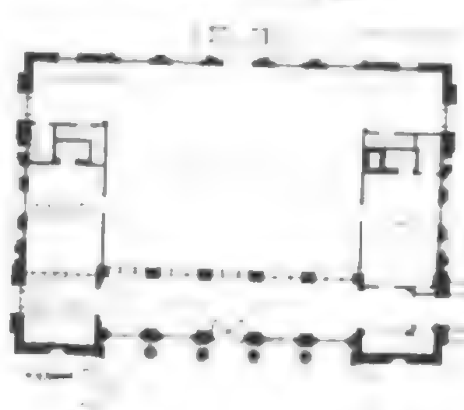
CORRIDOR OF CELL ROOM

GENERAL VIEW

DETAIL OF ENTRANCE FRONT



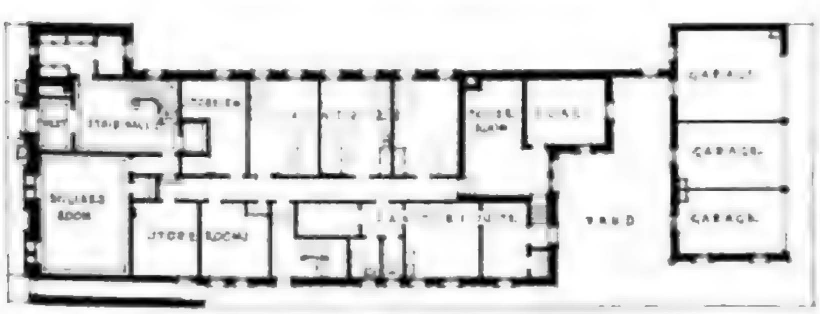
MEZZANINE FLOOR PLAN



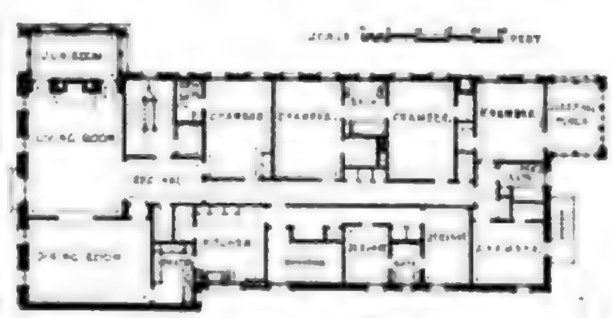
FIRST FLOOR PLAN

U. S. POST OFFICE BUILDING, WAUKEGAN, ILL.

WYATT & NOLTING, ARCHITECTS



BASEMENT FLOOR PLAN



TYPICAL FLOOR PLAN

APARTMENT BUILDING, SHERIDAN ROAD, CHICAGO, ILL.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS

The Selection of a Heating System.

By CHARLES L. HUBBARD.

THE following article takes up briefly the various methods of heating in common use, showing the advantages and disadvantages of each when applied to different types of buildings, and how to overcome the disadvantages to the greatest extent. The object is to assist the architect in selecting a system, or a combination, which will best meet the requirements in any given case, taking into account first cost, convenience, and economy of operation.

Dwelling houses may be satisfactorily heated by warm air, steam, or hot water, provided the systems are properly designed and adapted to the size, location, and special requirements of a given building.

For houses of six to eight rooms the warm air furnace may be made to give very satisfactory results and possesses a number of decided advantages over steam and hot water. The first cost is considerably less, it is simple to operate, and all parts are easily accessible in case of repairs. A furnace system warms up the rooms quickly, as the heat passes through the pipes and registers as soon as generated and continues to flow into the rooms as long as the fire is maintained. Steam and water both require a longer time for heating up, especially the latter, where a large volume of water must be warmed through a considerable range of temperature before an appreciable amount of heat is given off by the radiators.

While a steam system is quicker in action than water, the radiators cool off as soon as the pressure drops, unless equipped with vacuum air valves, and practically no heat is furnished to the rooms. The effect of a low fire in the case of a water system is similar to that with a furnace — a reduced quantity of heat being furnished; but it does not respond so quickly to changes in draft as the latter, owing to the larger body of water to be heated or cooled. A furnace system is especially adapted to cases where it is desired to close certain rooms or the entire house during the winter, since there is nothing to freeze when the fire is allowed to go out. With steam or water the entire system must be drained when the house is closed and water radiators must be kept turned on slightly at all times in unused rooms in cold weather to keep up sufficient circulation to prevent freezing.

The objection sometimes raised regarding the dryness of air with a furnace system may be entirely avoided by installing a furnace of sufficient size so that the warm air may be admitted to the rooms at a moderate temperature (about 120 degrees maximum) and by keeping the evaporating pan inside the casing supplied with water.

As a matter of fact, the air in a furnace-heated house is no drier than when steam or hot water is used. Neither system adds or removes moisture from the air unless special provision is made for it. The feeling of dryness often noticed is due to overheating the air, thus causing any dust which may have collected in the pipes and registers to burn and produce a slight smoke which causes a sense of dryness in the throat and nose. This effect is also increased by overheating, in another way, as it is likely to warp the plates, thus allowing gases from the fire to mix with the air before passing to the rooms. By using a furnace of proper construction and suitable size, this difficulty may be avoided.

The two most important objections to warm air heating, as compared with steam and water, are the difficulty of forcing heat into certain rooms in windy weather, and the cost of operation due to the large amount of cold outside air which must be warmed to the normal inside temperature of 70 degrees before any heat can be stored for transmission to the various rooms for purely heating purposes.

Both of these difficulties may be largely overcome and entirely eliminated in many cases by the use of return flues for returning a part of the air from the house to the furnace instead of taking in the entire supply from out of doors.

Under ordinary conditions the amount of air taken in from outside is several times greater than is required for good ventilation for the average number of occupants, which simply results in a waste of fuel. When there are high winds the supply of fresh air is still further increased by in-leakage around doors and windows; or, if the wind is in certain directions, the in-leakage may cause sufficient pressure within the building to prevent the usual supply from entering through the cold air box. In either case it will cut down the heat supply in proportion to the surplus air, due either to in-leakage or to cutting off the normal flow through the furnace casing and registers on account of the increase in pressure in the rooms above. This explains why certain rooms fail to heat properly in windy weather. It may be either dilution of the normal hot air supply or an increase in the cold air supply through leakage and a corresponding reduction in the hot air supply due to an increased back pressure in the rooms. All of these unfavorable conditions may be largely overcome by re-circulation of air within the building.

Under normal conditions the fuel cost may be greatly reduced by taking from one-half to two-thirds the air supply to the furnace from within the building, which will still provide sufficient outside air for good ventilation. In the case of winds, the supply through the cold air box may be reduced and the re-circulated air increased until, in the case of high winds, the entire amount may be taken from inside the building. Under these conditions we are simply utilizing fresh air which leaks into the building, that is, adapting the heating system to the reversal of conditions instead of trying to work against them. With both outside and return ducts, the proportion of outside and inside air may be varied, as desired, by means of a suitable mixing damper. Details of construction will depend upon local conditions; but, in general, the return flue should draw its supply from two or three separate rooms, and preferably from points near the outer walls.

In the case of small dwellings, a single return register in the front hall is usually sufficient, while in larger buildings one may be added in the living room, and at other

points as may be needed to equalize the circulation. Care should be taken to keep the two supply ducts separate until a point near the furnace is reached, and then the connection should be such that the outside air cannot by any chance blow into the inside duct.

In comparing the fuel cost of furnace heating with that of direct steam and hot water, the estimate should always be made on the assumption that the entire air supply to the furnace is to be taken from the inside of the building in order to place the warm air system on a common basis with the other two systems.

Direct steam is not well adapted to the heating of dwellings unless some special provision is made for temperature regulation. It is evident that the size of radiator for a given room must be proportioned for the coldest weather, and with steam at practically constant temperature the amount of heat given off will be practically the same at all time, regardless of the outside temperature. This condition calls for a frequent closing and opening of the radiator valves, or the opening of windows, which is usually undesirable on account of cold drafts and uneven temperature in different parts of the room.

The various vapor and vacuum systems upon the market have been designed to overcome this difficulty by varying the steam pressure within the radiator and consequently its temperature. These have proved more or less successful, according to their design and thoroughness of construction. Arrangements in which the pressure in the entire system is made to vary are necessarily limited in their range, owing to the difficulty of maintaining a high vacuum in the pipes and radiators without the use of a mechanically operated pump, or other similar device, which is not usually desirable in connection with dwelling house work.

When the joints are especially tight, sufficient steam pressure may be raised to drive out the air from the radiators, after which the pressure may be allowed to fall to a point considerably below that of the atmosphere, resulting in a corresponding lowering of the temperature of the radiating surface. The length of time between the periods of forcing out the air will, of course, depend upon the tightness of the joints and the packing around valve stems. With a well constructed system once or twice a day, say at morning and night, when more heat is required, should prove sufficient. An ordinary steam heating plant equipped with vacuum air valves may be operated in this way. When investigating a vapor or vacuum system for dwelling house condition, its simplicity should be carefully considered, as all work of this kind should be made as nearly automatic as possible, free from adjustments, and not likely to get out of order.

A simple way of obtaining a fairly good degree of regulation is to divide each radiator into two sections, in the proportion of one to two, separating them by a blind bushing which gives in effect two radiators having the appearance of one. Each should be separately valved, having a single connection. By turning on the smaller section, one-third of the surface comes into use, while the larger section gives two-thirds and both sections three-thirds, or the whole capacity of the radiator. Such an arrangement is free from complications and gives a sufficiently wide range for most conditions.

Steam heating is especially adapted to buildings of large size where the horizontal distances from the furnace to the bases of the uptake flues is too great for the successful operation of hot air. Steam can be carried any distance, the pipes are much more easily installed than air flues, and, furthermore, outside weather conditions have no effect upon the action of a direct radiator.

An advantage of steam over hot water is the ability to shut off the radiators in closed rooms without danger of freezing in extremely cold weather, and in case it is desired to close the house temporarily in winter time, it is a comparatively easy matter to drain the water from the boiler and return mains.

A disadvantage of direct steam as compared with hot air is the lack of ventilation. This may often be gotten around satisfactorily by combining it with indirect heating. In rooms which are not crowded, such as stair halls, corridors, etc., there is usually sufficient in-leakage of fresh air for the necessary ventilation. This may be taken as one complete change of air per hour in buildings of average construction. Sleeping rooms are comfortably heated by direct steam alone, as the in-leakage of air is sufficient during the day and ventilation by open windows at night is commonly practised at the present time. For living rooms and others where better ventilation is desired, indirect stacks may be used.

The advantage of indirect steam over hot air comes from the fact that the stacks may be placed at or near the bases of the flues leading to the different rooms, thus doing away with long horizontal ducts and avoiding to a large extent the effect of wind pressure upon exposed rooms.

Among the minor objections to steam may be mentioned inaccessibility of pipes in case of repairs, snapping or water hammer in the pipes, leakage of water through air valves, unsightly appearance of direct radiators and pipe risers, and danger of boiler explosions. These, however, may be disposed of for the most part without difficulty.

The pipe risers may often be run where they are easily reached in case of repairs, as in corners of rooms, behind doors, in closets, and other locations where, if painted to harmonize with the walls, they will not prove unsightly. When it is necessary to conceal them completely, extra heavy pipe should be used and all joints tested under pressure before closing in. Risers installed in this way should last for thirty years or more without need of repairs.

Snapping, or water hammer, after the pipes and radiators are once warmed up, is entirely unnecessary in a well designed system and can always be avoided by proper drainage and the use of pipes of suitable size. It is not important for the architect to be familiar with the details of construction necessary to obtain this result, but he should thoroughly understand that a quietly working system is possible and insist upon securing it.

Leakage of water, in any amount, through air valves, is due either to improper drainage or to closing the steam valve and leaving the return valve open, thus allowing the water to back into the radiator from the boiler. If the difficulty is due to poor drainage, the fault should be located and corrected. Troubles of this kind may lie either in the grading of the radiator itself or in the pipe connections. In the case of new systems it is best to use

the one-pipe radiator connection, which makes it impossible to overlook the return valve. If the trouble occurs in an old building, equipped with the two-pipe system, it will be necessary to remember always to close both valves when shutting off a radiator. A slight dripping or spitting at the air valve may often be stopped by proper adjustment. If this does not prove effective, a better grade of valve should be employed; those projecting a short distance into the radiator or provided with a capillary strip are less likely to give trouble in this way.

The unsightly appearance of direct radiators may be avoided to a considerable extent by selecting a plain pattern of symmetrical proportions, as regards length and height, and decorating it according to the color scheme of the room.

Danger of boiler explosion is so slight as to be practically negligible. The type of cast-iron boiler commonly used for house heating has a large factor of safety for the low pressures carried, and explosion is amply guarded against by an automatic safety valve and check damper. Furthermore, the construction of most boilers is such that a fracture is confined to a single section and simply results in the water leaking out of the boiler. Suitable care, however, should be taken to see that the safety valve and automatic damper regulator are kept in good order.

While steam may be better adapted to certain types of buildings than either hot air or hot water, the two latter are the standard systems of heating for dwelling houses. Under ordinary conditions hot air has the advantage in small houses of six to eight rooms, while direct hot water, supplemented by indirect stacks for one or more of the most important rooms, is better adapted to buildings of larger size.

The great advantage of hot water over steam is in the matter of temperature regulation, it being possible to vary the temperature of the water circulated according to the outside weather conditions, in which way it closely resembles the hot air system. Hot water heating is better adapted to larger buildings than furnace heating, because the action of a radiator is not affected by its horizontal distance from the boiler or by the strength and action of the winds, except as it is necessary to offset the effects of the in-leakage of cold air, which is common to any system of heating. Although it does not provide abundant ventilation, it has already been shown that in many rooms a sufficient amount of fresh air may be obtained by leakage and through open windows, and when indirect heating is provided for the living room, or other rooms requiring especially good ventilation, it probably makes the best arrangement, everything considered, for buildings of a medium or large size.

Mention has already been made of the danger of freezing in extremely cold weather. This may be guarded against by locating the expansion tank in a warm room, close to a chimney in the attic, or by the use of circulation pipes which keep the water constantly moving through the tank. All radiator valves should be provided with a small hole (1/8 to 3/16 inch) drilled through the gate, which will allow a slight circulation through the radiator sufficient to prevent freezing even when the valve is closed.

It is true that hot water requires a greater length of time for warming up than either a furnace or steam. On the other hand, the temperature of a house heated with hot water does not fluctuate so readily as when either of the other two systems is used, because the large body of heated water contained in the system acts as a regulator or "balance wheel." The proper and most economical way is to run as even a fire as possible continuously and not allow the house to cool down too much at night. The forcing of a fire for an hour or two in the morning for warming up the house takes practically as much fuel as to carry a moderate fire during the night, to say nothing of the added comfort secured by the latter method.

The cost of installing a hot water system is somewhat greater than for steam, owing to the larger amount of radiating surface required. This, however, can be reduced by the use of a hot water "generator," which makes it possible to carry much higher water temperatures than with the open tank system. The cost of operating a hot water plant is less than for steam, owing to the better regulation of temperature, the amount of saving varying with the skill and care exercised in running the boiler.

While the present article is intended primarily to cover the heating of dwelling houses, a few other types of buildings will be included, outlining briefly some of the systems, or combinations, which have been found to operate successfully in different cases.

School buildings of four to six rooms may be heated satisfactorily by means of hot air by providing a separate furnace for each pair of class rooms, locating them so that the connections with the inlet registers are very direct and without horizontal runs of piping. The best results are obtained by supplying the furnaces from cold air chambers, which take their supply from at least two sides of the building, each inlet being of sufficient size to furnish the full amount of air in still weather and provided with cloth checks for preventing a reversal of flow. If four inlets are available, any two should be capable of supplying the maximum quantity of air. The best arrangement of air distribution will depend somewhat upon the plan of the building. Sometimes each furnace is made independent, while in other cases it is more convenient to place the furnaces in separate chambers and supply them all from a trunk line, taking its supply from a number of inlets located in different sides of the building.

Furnace-heated schoolrooms require generous vent flues provided with means for supplying artificial heat for accelerating the outward flow. This may often be done by using an iron smoke pipe from each furnace, carrying it to the roof through a brick vent flue, which shall take the exhaust ventilation from a pair of rooms. When this is not possible it will be necessary to place small stoves or flue heaters in each vent shaft.

For buildings of larger size it is best to employ steam, as the multiplication of furnaces makes a large plant which is difficult to care for. When steam is used, the entire heat supply may be obtained from a single boiler or battery of boilers, thus greatly simplifying the work of firing and the removal of ashes.

For buildings containing from eight to ten class rooms very good results may be obtained by means of the indirect gravity system, although a fan is recommended for ten rooms when the available funds will allow. A simple

arrangement for this size of building is to lay out the plant the same as for a gravity system, so far as the stacks and warm air flues are concerned, and accelerate the cold air flow by means of an electrically driven disc fan. This type of fan is not expensive, and when the resistance is low, as in the above arrangement, the power requirements are small. For over ten rooms the regular blower system, employing the centrifugal fan, should be provided if possible. With this type of fan higher air velocities may be employed, thus reducing the size and cost of flue construction.

One of the best methods is to heat the air to a temperature of 70 to 72 degrees by means of a main heater at the fan, and provide the necessary heat for warming the rooms by means of an independent system of direct coils placed along the outer walls beneath the windows. This gives greater flexibility, as the building may be warmed independently of the ventilating system and the fan need only be run while school is in session.

Many systems are installed in which the heating is done by indirect or secondary stacks placed at the bases of the flues. While this may be made to give satisfactory results, the system employing direct coils seems to be growing in favor and a majority of the latest school buildings have been equipped with this system, especially in the East.

When a system of indirect gravity heating is employed, special aspirating coils or heaters should be placed in the vent flues. This detail, however, is not necessary in case of a fan system, as the pressure within the room is sufficient to cause an outward flow.

Hot water is not often used for the warming of school buildings, except in large plants under forced circulation. Buildings of this type are usually equipped with automatic temperature regulation, so there is no especial advantage in adding the necessary equipment for hot water heating under these conditions. In industrial schools where power is required, the exhaust from the engines is frequently used for heating water for warming the building, and power generated upon the premises for driving the circulating pumps. In many cases, however, even under these conditions, it will be simpler to turn the exhaust directly into the heating coils and employ automatic temperature regulation.

In general, the choice of a system in buildings of this kind lies between a vacuum system and forced hot water, as it is necessary in either case to use automatic regulation in order to secure an even temperature in the different rooms. As between steam and water, under these conditions, there is but little difference in results, and personal choice and small variations in cost are the governing factors in most cases. Hot water requires a special heater, circulating pumps, and motors, while vacuum steam calls for vacuum pumps and thermostatic valves upon the coils and radiators.

Churches are heated by furnaces, indirect gravity steam, or by fan systems, according to size and the results desired. For auditoriums seating up to about 300 people, furnaces may be made to give good results by using a type especially designed for handling large volumes of air at moderate temperature. Much of the success of a furnace system depends upon the provision made for the removal of foul air, as the resistance to an inflow of outside air must be made as slight as possible. This calls for vent flues of ample size, heated by special stoves or iron chimney flues. For larger buildings, indirect steam may be used, although it is much better to employ a fan for cases where the seating capacity is above 500.

Both furnace and indirect steam systems should be provided with flue arrangements for the re-circulation of air for quick warming, or for use when ventilation is not desired. When the auditorium is in use the full supply of air should be taken from out of doors. A disc fan may often be used to advantage with both of these systems without adding very much to the cost of construction, thus making them more independent of the strength and direction of the wind. Churches of large size should always be provided with a centrifugal fan, the air being distributed to the auditorium through a large number of small openings either in or near the floor. The vent outlets in this case should be largely in the ceiling, as the object is to maintain a constant upward current of air. The admission of air may be through long narrow slots along the lower edge of the pew seats, through registers in the pew ends, or through mushroom ventilators in the floor beneath the pews.

Assembly halls should be heated much the same as churches, except in the method of introducing the air, which must be done largely through wall registers, as the floor must be kept clear for dancing or other purposes. The usual arrangement is to place the inlet registers from 7 to 8 feet from the floor and take off the greater part of the foul air either at or near the floor, providing ceiling vents for summer use or when the room is crowded and it is desired to cool it quickly.

Theaters should always be furnished with a fan system of the pressure type, the air being introduced through mushroom ventilators beneath the seats or specially designed chair legs. The vent should be from the ceiling and through wall registers beneath the galleries. Heat for the auditorium is best provided by a main or primary heater at the fan, controlled by a thermostat in the room. Chilling of the floor may be guarded against by means of a second thermostat placed in the air duct beyond the fan, and set to prevent a drop in temperature to less than 62 to 65 degrees. All the other rooms should be heated by direct radiation or by supplementary stacks placed at the bases of the fresh air flues when the rooms are ventilated.

Roxbury Boys' Club, Roxbury, Mass.

HAROLD F. KELLOG, ARCHITECT.

THIS building was recently dedicated as the headquarters of both the Roxbury Boys' Club and the Boys' Institute of Industry. The Boys' Institute of Industry was founded in 1884 by Edward Everett Hale and has been in continuous existence and operation since that time. Dr. Hale was the president of the Institute for over twenty years. The Boys' Club was organized in 1910, but due to serious handicaps was forced to give up its operation until the combination of the two associations made it possible to erect the present building.

The organization is entirely and strictly non-sectarian. It has been fortunate enough to receive the very enthusiastic support of the business men of the neighborhood as well as of other prominent citizens.

The design of the building, which follows general classic precedent, is carried out by the use of Harvard brick with limestone trimmings. The quality of the brickwork is particularly noticeable, since its texture owes its interest to the irregular setting of the bricks and to the fact that the usual black headers were laid as stretchers, thus giving a range of color from very dark to quite light. No effort was made to obtain any regularity of spotting or gradation.

Bubbler Fountain in Corridor

The club, as its name implies, is devoted entirely to the uses of the boys in the neighborhood and there are, therefore, not only the rooms for amusements but also rooms for classes where various trades are taught and practised.

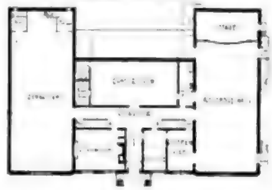
The basement contains the swimming pool, which is 30 feet wide by 70 feet long. Adjoining this are the filters used to keep the water constantly pure. There is also a gallery overlooking the pool which is for the use of visitors. The large locker room is separated from the pool by a room of shower baths, while a laundry immediately adjoining the locker room provides each boy with a clean suit without cost each time he swims. There is also in the basement four bowling alleys and a large billiard room besides the room for the carpentry class and a room for the printing class. The boiler room contains not only the heating plant but also tanks where the water for the pool is heated.

On the first floor, conveniently arranged on one side of the vestibule, is a reception room for visitors and the office of the superintendent. On the other side of the entrance is the reading room, with an attractive fireplace and bookcases. This reading room is in direct connection with the Boston Public Library, by means of daily automobile service, so that practically all of the conveniences of a large library are to be had.

Directly on the main axis is the entrance to the game room. The two wings of the building are occupied by the two main features of the building, the gymnasium and the assembly hall, or dining room. Each of these rooms is 30 feet wide by 75 feet long and extends through two stories. The gymnasium is well equipped with the latest apparatus and is large enough for games of basket ball, squash, or hand ball. The assembly hall has a stage at one end so that amateur performances or lectures may be given. A conveniently large serving room between the assembly hall and game room makes it possible to turn either into a dining room when so desired. The serving room is connected by a dumb waiter with the kitchen on the floor above.

On the second floor, besides the space occupied by the upper parts of the assembly hall and the gymnasium, there are also rooms for the cobbling and drafting classes, and a music room. Another recreation or game room and a kitchen with a small pantry occupy the remainder of the floor. The roof has been kept flat in order that the boys may use it as a play ground or open air gymnasium during the summer months.

Second Floor Plan



First Floor Plan

Basement Floor Plan

The interior finish and decorations are extremely simple. A dado of hard pine was carried around nearly every room in order to avoid the battered appearance plaster would have after a few months' abuse by children. The floors throughout are of maple. The swimming pool is lined with glazed brick, and the gymnasium walls are also of white brick.

In the first floor corridor is the unusual fountain illustrated herewith. It is an interesting decorative treatment of the usual ugly bubbler fountain and was modeled by the architect.

The assembly hall is extremely simple, decoration being limited to the openings,— the proscenium, the doors, and the windows. The architectural effect, however, is quite dignified. The reading room has a good deal of character with the simple use of a beamed ceiling, a decorative fireplace, and plain bookcases.

The cost of the building was kept extremely low by study and consideration, in an effort to meet the large requirements with the limited money available. On the basis of cubic measurement, the building cost $16\frac{2}{3}$ cents a cubic foot. The construction throughout the interior is second class.

Detail of Entrance Doorway

Detail of End Windows

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

HOWARD VAN DOREN SHAW

HOWARD SHAW'S strong and lovable nature was tuned by well chosen ancestry to the finer things in life, and the ruder winds sweep by and do not disturb the poise nor stir the strings to inharmonious vibration. For Shaw the winds of life do not blow from one but from many quarters; not at one but at many velocities; not at one but at varying temperatures. And so the record they leave is of broad and varied interest.

A keen student of what is best in modern German architecture, he has allowed that spirit to play in what in result is an admirable setting for our American social and commercial life. In this setting is more distinctly discernible the strong blend of his English idealism. Shaw's work must be fully represented to make any treatise on the American country house complete or satisfying. Moreover, the distinctive warehouse and commercial architecture of the Middle West received a great impulse directly from the Lakeside Press building — Shaw's first large commercial commission. The spirit animating this architecture is spreading the country over, establishing itself even in the presence of the De Vinne Press building in New York City, the building which gave Shaw, and one or two kindred spirits, the clue to a possible real American commercial type. It is Shaw's work, rather than the earlier and more austere example, which has influenced so many others, and his printing and publishing buildings and warehouses stand out from the ranks distinguished and clearly individualized. Shaw's Second Presbyterian Church, though a remodeled structure, was thoroughly new as to its interior and challenged attention by the freshness of its treatment.

Howard Van Doren Shaw was born in Chicago May 7, 1868. He was graduated from Yale College in 1890 with the degree of B.A., and soon thereafter took up the study of architecture in the Massachusetts Institute of Technology. For twelve years he has been a trustee of the Art Institute of Chicago, acting on its executive and art committees, and has been officially connected with church, community, and charity organizations. His college and home life have given him the requisite background of culture and tradition. His point of attack is so fresh and unhackneyed even when he is dealing with the traditional and conventional, that for the very joy he puts into life some of his friends are quite content, as it is to be presumed he himself is, that Shaw is not the seer, but that he is satisfied to let the voices of the past and the very present speak through his æsthetic nature. — *I. K. P.*

AUSTIN W. LORD

BORN in Minnesota in 1860, of French ancestry on the paternal side, Mr. Lord entered the Massachusetts Institute of Technology in 1884, taking a special course and winning the Rotch Traveling Scholarship in 1888. His studies in Rome brought him at once into a congenial atmosphere, where he gained a love for, and an understanding of, the great principles of architecture which were later augmented by his work under Mr. McKim on the Brooklyn Museum of Arts and Sciences and on the Columbia University buildings. In 1894, Mr. Lord was appointed Director of the American Academy in Rome, remaining there until 1896.

These two periods of study in Rome and his close association with Mr. McKim were dominating influences in Mr. Lord's career. A student by nature, gifted with a refinement of feeling and a clarity of judgment, Mr. Lord escaped the mannerisms and exaggerations of scholastic tradition. His work with Mr. McKim gave him a true understanding of the relation of design to executed work, of the proper application of historic precedent to modern conditions. He has the truly classic appreciation of simplicity in mass, of restraint and refinement in decoration.

Mr. Lord's appointment in 1912 as Professor of Architecture and Director of the School of Architecture in Columbia University was particularly fitting, and it was a source of regret to many that he was unable to continue to direct the policy of that very important factor in the architectural education of this country.

In his work Mr. Lord has shown great breadth and imagination. While much of his work has been monumental in character, such as the McKinley Monument at Columbus, the Soldiers and Sailors Monument at Albany, the Masonic Temple in Brooklyn, and the Supreme Court Building of White Plains, Mr. Lord derives great enjoyment from domestic country architecture.

His work as architect to the Isthmian Commission, combining as it did the general plan of a town and all types of buildings, from the monumental administration building, the technical lock control and power houses to the homes of the employees, shows Mr. Lord's ability to handle a complex problem in all its parts. Climatic, sanitary, and economic requirements are frankly met

In creating him a Fellow, the American Institute of Architects conferred an honor upon itself, as well as upon Mr. Lord, for it recognized the sterling qualities of the scholar, the educator, and the architect.—*J. C. L.*

DAVID KNICKERBACKER BOYD

FOR twenty-five years David Knickerbacker Boyd has been one of the most active and useful workers in the profession. No one in Philadelphia has given as much time and study, no one has served on more committees, and no one has put more enthusiasm into the rank and file of both architects and draftsmen than he.

Mr Boyd was born in Philadelphia in 1872, the son of David Boyd, Jr., and Alida Visscher Knickerbacker. His early education was obtained at the Friends Central School and the Rugby Academy of Philadelphia. He later attended the Spring Garden Institute, the Pennsylvania Academy of the Fine Arts, and the University of Pennsylvania, after which he traveled abroad. He commenced the practice of architecture in Philadelphia about the year 1892 when with his brother he formed the firm of Boyd & Boyd. The firm was dissolved in 1897 and since that time Mr. Boyd has practised independently.

He has been continuously in the service and in the councils of the profession since about 1891, when he first became treasurer of the T-Square Club of Philadelphia. Although there is no gray in his hair, he has, nevertheless, been affectionately known to his fellow-workers as the "Grand Old Man" for at least half that time, and whether among draftsmen or among members of the local chapter or as secretary and afterward as 2d vice-president of the Institute itself, he has always managed to endear himself to those he has come in contact with by assuming burdens and doing work that few others, in active practice, would undertake. Furthermore, not content with that, he has invented many activities which are now moving along under the guidance of competent committees as being necessary to the advancement of the profession.

These activities were started in the Philadelphia chapter with which Mr. Boyd has so long been connected, and were later adopted by the Institute as part of its regular work in expanding the scope and usefulness of the profession. The most important of them are the committee on the Regulation of Competitions, the committee on the Preservation of Historic Monuments, and the committee on Public Information His most important work, however, came when he took the office of secretary of the Institute itself. This came at a most vital period in the history of the Institute,—a period of reorganization. What sacrifices he made to bring about order and to install modern methods in that office, few will ever know.

Mr. Boyd's practice has been varied Schools, churches, a library, warehouses, and office buildings have formed part of his work: he is, however, best known for the many suburban houses which he has designed so successfully.

Mr. Boyd is esteemed and honored not alone among his confrères in the profession, but he is also extremely popular among contractors, engineers, and other specialists, and has been able to do much to bring about a better understanding between architects and the workers in allied fields.—*A. K.*

WILLIAM G. NOLTING

MR. NOLTING is a noteworthy example, among the present-day successful architects in America, of one who has acquired this position not through any outside advantages afforded him in his more youthful days, such as architectural school or academic training, or even the knowledge acquired from a long period of work in an office. He is rather among those men who have the mental capacity of readily selecting and absorbing what are really the essential and important elements in the study of the profession, making himself master of these and eliminating the non-essential and superficial, and this a man of his temperament is able to do from a varied environment by clearness of insight, good judgment, and an innate good taste.

Mr. Nolting was born in Baltimore in 1866, but obtained his earlier education in the public schools of Richmond, Va., which city was the home of his family. Not having the opportunity of a collegiate education, he entered the office of Mr. Albert Lybrock, at that time the best known local architect. He was soon able to see that he would be unable to obtain a broader understanding of his ideals unless he should have an opportunity of being placed in a broader field than Richmond then presented. He accepted an opening offered him in the office of Mr. William M. Poindexter, in Washington, also a native of Richmond and a friend. He later had an opportunity to enter the office of Mr. Henry Brauns of Baltimore, where he remained only a short while, being offered a position with Hornblower & Marshall of Washington, an office at that time containing a group of men holding the higher ideals in the profession. Later, he accepted a position with J. B. Noel Wyatt, whose firm of Wyatt & Sperry had just been dissolved by Mr. Sperry's moving west, and within the year was offered a partnership which formed the firm of Wyatt & Nolting

Mr. Nolting finds the greater interest in the broader work of the profession which calls for the solution of the general problem, even more than in the later development of the details. His trend of mind makes him clear sighted to grasp the essentials; it tends also to make him clear sighted and accurate in strictly business matters, so that he has become a man whose opinions are valued in the business schemes which often develop from and are associated with important architectural work.

Among the more important buildings that have been designed by Wyatt & Nolting, the one that bears most distinctly the impress of Mr. Nolting's ability is doubtless the Baltimore City Court House, completed some fifteen years ago. The work of the firm has also been conspicuous in the development, during the last fifteen or twenty years, of the beautiful suburb of Roland Park. Designs have also been made for many of the more important public institutions, club buildings, and residences, in and near Baltimore, and for several office and bank structures and government buildings in other cities.—*J. B. N. W.*

PLATE DESCRIPTION.

Maryland State Normal School, Towson, Md. Plates 1-5. This group of new buildings consists of an administration building, one dormitory building, known as Newell Hall, and a power house. The exteriors are of a dull toned brick, with trimmings of gray terra cotta. The construction is reinforced concrete, with gypsum block partitions.

In the administration building are located the administrative offices, recitation rooms, laboratories, lecture rooms, library, reading rooms, the practice school, the domestic science department, the cafeteria for day students, and the auditorium which seats about 1,200 persons.

Newell Hall, the dormitory, is planned for young women students and will accommodate about 200. The rooms are arranged in suites of two with bath between. The music practice rooms and parlors for resident students are in the main part of this building, with the kitchen, pantries, and dining room for resident students located in a wing extending toward the rear.

West Side Market House, Cleveland, Ohio. Plates 6, 7. The walls of this building are of brick with a large amount of stone trimmings. The covered shed extending around two sides of the building, with a wide driveway on either side of it, provides space for wagons and temporary stalls. The first floor of the main building houses the general stalls together with a drug store, newsstands, waiting room, and toilets. The basement provides storage room for the markets and also contains the heating plant and the refrigeration system.

Santa Fé Railway Station, San Diego, Cal. Plates 8, 9. Clay products have been largely used throughout this building. The walls are of brick with stucco on the outside and plaster on the inside. The roofs are of red tile, while the domes of the towers are covered with glazed tiles in various colors. The waiting room has a wainscot of distinctly Moorish character executed in highly colored faience. The floors throughout the building are of quarry tile and the patio and arcades are paved with brick.

Building for the Fire and Police Departments, Winchester, Mass. Plate 10. Although designed as one building and heated from one central plant, this structure houses the fire and police departments quite distinctly, a brick fire wall separating the two. The design was carried out in a red brick with artificial stone trimmings. The construction throughout is fireproof. The roof is of slate.

The first floor of the fire station, besides housing five pieces of apparatus, has a lounging room for the men and a completely equipped repair room. The second floor is given entirely to rooms for the men and to the signal and battery rooms, which are lighted through the belfry. Space is allowed beneath the fire station for the storage and drying of the hose.

The first floor of the police station has the usual requirements. The second floor contains the guard room, lockers of the officers, wash rooms, and bedroom for the sergeant. The approximate cost of the whole building was $50,000.

Fire Station, Weston, Mass. Plate 11. In this building a water-struck red brick was used with a wide gray flush joint, while the trimming is of limestone. The roof is covered with slate.

The first story is entirely fireproof, the floor being of reinforced concrete slab construction and the ceiling plaster on wire lath. The hose tower is shut off by fire doors. The second floor provides a bedroom and recreation room for the men as well as a room for the meetings of the fire committee. The approximate cost of the building was $18,000.

Fire Station, Watertown, Mass. Plate 12. The materials used on the exterior of this town fire station are red water-struck brick and limestone trimmings with green slate on the roof. The interior walls of the apparatus room are also of brick, which with the reinforced concrete floor construction and the wire lath ceiling make this room fireproof.

There is a very complete equipment of electrically operated devices for opening and closing doors and pole-holes. A drying room in the basement takes the place of a hose tower. The cost of the station complete was about $10,500.

Police Headquarters Building, Mount Vernon, N. Y. Plates 13, 14. This building is the first one to be completed of a group which will form a civic center. The main part of the building is occupied by dormitory quarters for the police and the necessary muster room, detention room, trial room, and offices. In the rear and connected by corridors is the cell building, divided in two parts by a party wall for the division of male and female prisoners. In the cell building there is also a hospital room and the matron's suite.

The building is of fireproof construction. The finished floors are generally of composition. The brick is laid in Flemish bond and the trimming is marble. Gray slate was used in the roof.

U. S. Post Office Building, Waukegan, Ill. Plate 15. The exterior of this building is of a rough red brick laid in a special bond. The base of the building, the columns, cornice, and other trim are of Indiana limestone. The roof is covered with copper.

On the interior the finish is very simple except in the public lobby, where there is a wainscot of Italian marble running up to the spring line of the vaulted plaster ceiling. The construction throughout is fireproof.

The cost, excluding the movable post office equipment, but including the pavement, approaches, and grading, was about $73,000.

Apartment Building, Sheridan Road, Chicago, Ill. Plate 16. The style throughout this building is Colonial in feeling, the interior being largely of white enamel finish. The equipment includes automatic push-button elevator and vacuum cleaners. A novel feature of the scheme is a roof garden built above the garage. The roof of the garage being of concrete, a layer of hollow tile was placed on top of this for drainage, and then 18 inches of soil on top of the tile. The cost of the building was about 28 cents per cubic foot.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IN the report made at the recent convention of the American Institute of Architects there are references to the attitude of the members of the present national administration toward the question of government architecture which are quite worthy of note, since they concern a matter upon which depends so largely the development of higher standards of architecture in this country.

Recently there have been two actions on the part of the Treasury Department — the department from which the office of the Supervising Architect is governed, which lead one to apprehensions for the future. The first is the general character of the building now being erected in Washington for the Department of the Interior, and the other is the proposed character of the new Post Office to be built in Chicago.

The building for the Department of the Interior will be one of the largest of the government buildings. With a floor space covering a large area and reaching high into the air, it will be the dominant feature for a considerable surrounding distance and should, therefore, be a monument of such character as to harmonize with the rest of the buildings of the capital. Instead of this, however, we find quite the opposite to be true. The design is of the commercial type and exhibits no effort toward obtaining any monumental effect.

It has been suggested that the building is to offer only temporary quarters to meet the unusual requirements of this fast growing department, and that since another building will be erected later, the character of the present work is not of particular importance. At certain times makeshifts are unavoidable, but the unfortunate fact is that too frequently what was effected as a makeshift becomes accepted later as a permanence, although the first intentions may have been ever so earnest. This occurs most frequently when the original expenditure has been very large, as is the case in this instance. But even if the circumstances should make this really a temporary scheme, it is unfortunate that the importance of the whole matter did not lead to a more happy solution.

If this attitude toward the vital matter of the design of public buildings is to be carried further, there will soon develop a distinct retrogression in the character of the architecture of our smaller cities and towns. It is a noticeable fact that, in small country towns, the erection of a post office of some architectural merit has been the starting point from which the community has made great strides toward a better expression of its community life. The character of this government work offers an incentive the value of which cannot be ignored. Moreover, a post office, by the very nature of its purpose, must be one of the buildings forming the civic center of a locality.

A serious condition has arisen in Chicago, a city which by its very importance should receive unusual considerations. In the Chicago city plan as developed under Mr. Burnham's direction, some years ago, the Post Office was located on the west bank of the Chicago River near the Northwestern Railway Station and forming part of a proposed center, or grouping. The government is reported to be purchasing a piece of property of such small area that in order to fulfil the needs of the city, the Post Office must be of the sky-scraper type instead of the comparatively low structure proposed in the city plan as being compatible with the proposed surroundings. Here, again, a large share of the consideration is one of expenditure, since the cost of the land necessary for the erection of a building such as proposed in the city plan is considerably larger than that necessary for a sky scraper. This part of the question must be decided by viewing the matter from many angles, but the æsthetic possibilities of the proposed civic group and plaza should do much to override any smaller considerations of a temporary character.

The discussion concerning the Chicago Post Office has brought to light an unfortunate misconception which exists in the minds of many congressmen and other Washington officials. The word "monumental" to them seems to carry with it a sense of inefficiency, of sacrifice of practical considerations for artistic effects. To be sure, some examples of so-called monumental buildings would lead many to this conclusion; but it cannot be suggested that it is impossible to obtain an efficient working plan for demands which may be ever so complicated and yet have the architectural expression on both the exterior and interior of the character generally called monumental.

Any action which does not give such a building to Chicago will be unfortunate, not alone for the people of that city, but for the people of the whole country in that it will do much to harm what promises to be the realization of one of the finest cities in the United States.

If we take these two cases as a prediction of the attitude of the administration toward other future government work, it is to be hoped that every citizen who holds the larger view of the value of our country's artistic life will do his share toward counteracting this influence.

THE New York State Board for the Registration of Architects announces that the date of closing the competition for a design of the State Architects' Certificate has been extended from January 25 to March 1, 1916.

BEGINNING on page 30 of the advertising section of this issue of THE BRICKBUILDER we present a list of the important printed matter published by our advertisers, so arranged as to be of the greatest convenience and use to our readers. This department has been added to our pages only after a careful investigation of the subject had convinced us that much of the literature issued by leading manufacturers of building materials is of great value to architects, and we venture the opinion that some are not even aware of the existence of many of the treatises, booklets, and specification helps which are listed in this new department.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

FEBRVARY
1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS

DONATO D'ANGNOLO BRAMANTE

BORN 1444. DIED 1514. NATIVE OF URBINO. ARCHITECT OF THE TEMPIETTO OF S. PIETRO IN MONTORIO, THE COURT YARD OF SANTA MARIA DELLA PACE, WORK AT ST. PETER'S AND THE VATICAN IN ROME, AND OF THE CHOIR AND DOME OF SANTA MARIA DELLE GRAZIE IN MILAN

THE BRICKBVILDER

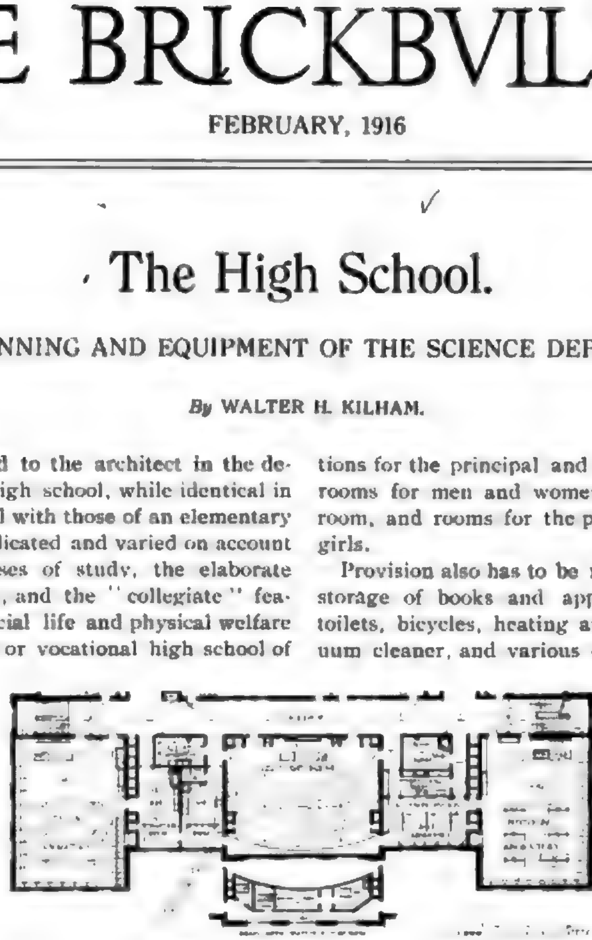
VOLUME XXV FEBRUARY, 1916 NUMBER 2

The High School.

THE PLANNING AND EQUIPMENT OF THE SCIENCE DEPARTMENT.

By WALTER H. KILHAM.

THE problems presented to the architect in the designing of a modern high school, while identical in matters of general detail with those of an elementary school, are much more complicated and varied on account of the many different courses of study, the elaborate apparatus which is installed, and the "collegiate" features connected with the social life and physical welfare of the pupils. A commercial or vocational high school of the present period combines most of the features which until recently were found only in the larger universities, together with many others which are purely a development of high school education. A high school of a thousand or twelve hundred pupils may require, in addition to the regular standard class rooms, 24 by 30 feet, accommodating say thirty-five pupils, a certain number of recitation rooms seating about twenty pupils each; probably one or two study halls; large rooms with single desks and chairs accommodating from seventy-five to one hundred and fifty or more pupils; a library; a science department with laboratories and lecture rooms equipped for instruction in chemistry, physics, and possibly biology and botany; a commercial department for instruction in bookkeeping, stenography, typewriting, and banking; rooms for free-hand and mechanical drawing; a music room; a department for domestic science, *i.e.*, cooking, housekeeping, and sewing; and a manual training department for wood and iron working. In addition to these usual pedagogical requirements some cities introduce facilities for the study of printing, bookbinding, natural history (with menageries of animals and birds), and various other topics.



Portion of Third Floor Plan, Showing Science Department
Salem High School, Salem, Mass.
Kilham & Hopkins, Architects

The social and physical cultural side of the school's work requires an assembly hall, gymnasium, and locker accommodations, perhaps a swimming pool, a lunch room, rooms for the school paper and athletic society, and in large cities sometimes an arrangement on the roof for outdoor dancing.

The administrative department requires accommodations for the principal and his assistants, clerks, retiring rooms for men and women teachers, a teachers' lunch room, and rooms for the physical directors for boys and girls.

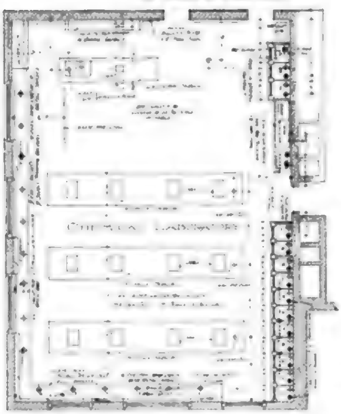
Provision also has to be made for the pupils' clothing, storage of books and apparatus, unpacking of cases, toilets, bicycles, heating and ventilating apparatus, vacuum cleaner, and various other things which may vary in different places, not forgetting permanent provision for the inevitable wireless outfit which will surely encumber the roof with unsightly aerials made by a local carpenter unless a neat construction is provided in the contract.

High schools are generally equipped for instruction in chemistry and physics, and sometimes for biology, physiography, and various other sciences. The most elaborate equipment is that required for chemistry and physics, and a separate laboratory is generally provided for each of these two studies, ordinarily fitted up for sections of twenty-four students at a time to practice experiments. As the lectures on these subjects require the setting up of special apparatus which requires a good deal of time, it is convenient to assemble several sections at one time in a lecture room which seats multiples of sections, as forty-eight, seventy-two, ninety-six, or one hundred and twenty. This lecture room is most conveniently placed between the chemistry and physics laboratories, with storerooms adjoining on either hand for chemical and physical apparatus. When the school is a small one and one teacher handles the entire science department, one storeroom may be enough; but it is always better to provide separate rooms to avoid possible damage to delicate physical apparatus by fumes from chemicals. Windows may be arranged in these storerooms for passing out materials, but doors will usually suffice.

Location of Science Department. On account of the desirability of quickly getting rid of the fumes from chemical experiments the science department is generally located on the top floor. If placed on the first floor or basement,

Chemistry Laboratory, Salem High School, Showing Tablet Chairs on Which to Take Notes

the plumbing would be greatly simplified and the wastes from the chemistry sinks which have a tendency to corrode iron pipes could be carried away in tile. Some educators also prefer to keep the older classes on the ground floor, where they may receive more personal attention from the principal, and as science is an upper class study this at once locates the laboratories on the ground floor. But the most general practice by far is to keep the younger children near the ground and the laboratories at the top, where they can be easily ventilated and well lighted by skylights, if necessary. Another advantage is the additional ceiling height which may be obtained for the science lecture room. On account of the amphitheatrical arrangement of seats a high ceiling is often required which is difficult to provide on the ground story, but can be easily managed at the top of the building. This arrangement also involves placing most of the class and recitation rooms downstairs and hence precludes a great amount of stair climbing by pupils who do not need to use the laboratories. Two stories ought to be the limit of height for suburban high schools, and the realization of such a practice seems to be in sight. At all events, the place for the laboratories is generally conceded to be the top story.



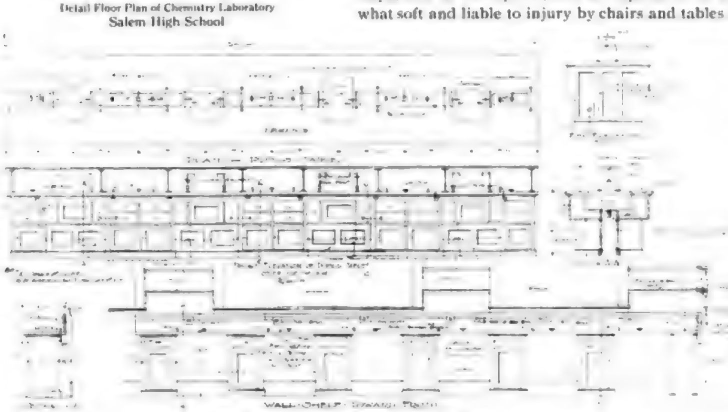
Detail Floor Plan of Chemistry Laboratory
Salem High School

The Chemistry Laboratory. The walls of the chemistry laboratory may preferably be of brick covered with a paint containing no lead, as lead will soon become discolored by the chemical action of gases. Plastered walls are often used to give a more finished aspect to the room, or on account of constructional difficulties in making all the walls of brick.

Ventilation. The ventilation of the rooms is arranged as in other rooms, except that special ventilation for noxious gases is provided in hoods which will be later described. In some cities provision is made for removal of gases from all experiments "at the source" over the working desks, by funnel-like pipes of copper leading down to a duct underneath, but this is not usually thought to be necessary.

Floor. Various opinions exist as to the floor of the chemistry laboratory. A cement floor is hard, cold, liable to "dust," and subject to injury from acids. Floors of the various magnesia compounds are perhaps not so cold and are in some ways superior. Terrazzo is subject to the same objections as cement. Asphalt is suitable in many ways, and is waterproof, but is unpleasant in appearance and somewhat soft and liable to injury by chairs and tables sinking into it. Tile, set in cement, is expensive, but in many ways makes an ideal floor for a laboratory. Wood is very commonly used for cheapness, and narrow strips filled in by asphalt make a very satisfactory compromise. It is rarely necessary to drain the floor. Some carefully kept schools have immaculate floors of waxed maple in their laboratories.

Equipment. — The working desks are generally made



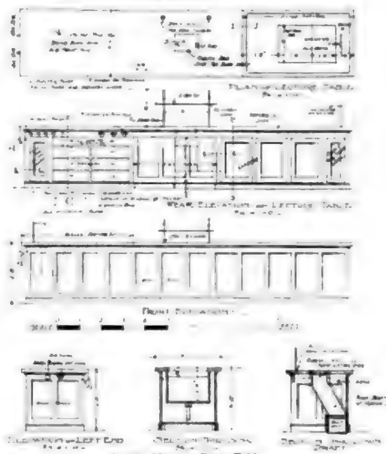
Detail of Fittings of Pupils' Tables in Chemistry Laboratory, Salem High School, Salem, Mass.
Kilham & Hopkins, Architects

4 feet wide, with spaces 4 feet wide between, to allow students to work facing each other. This causes half of the students to have their backs toward the instructor at all times, resulting, as some claim, in a loss of the teacher's efficiency of at least 50 per cent. Some laboratories have been fitted up with one-way desks at which all the pupils face toward the front of the room. These may be 28 inches wide, with aisles 3 feet wide, and some educators make the claim that one instructor can handle twice as many students when the desks are so arranged. When the double front system is used, the desks are made in sections which are placed back to back and are movable when the top is removed. This enables the room to be thoroughly cleaned during the summer vacation without disturbing the plumbing pipes. The desks contain drawers and lockers arranged as shown in the drawing for four times as many pupils as work at one time, *i.e.*, a laboratory which accommodates twenty-four students at one time would have drawer and locker accommodations for ninety-six, or four sections during the day. In large high schools, or schools operating also in the evening with a night master, a still further development of this space is necessary, which may be accomplished as in the Boston High School of Commerce by alternating with the working benches "blanks" or tables 3 feet wide, containing drawers and lockers, but no plumbing. These tables are very useful in providing additional apparatus space for the pupils while working. The working tables are 36 or 38 inches in width and a linear working space of 4 feet is allowed per pupil. Under each pupil's position an open space is arranged, both to give toe room and to provide a place for a stone receptacle for waste. The table is generally built of oak with a top of splined white pine 2 inches thick, treated with an acid-proof finish made as follows:

First Coat. 125 grains copper sulphate powder, 125 grains potassium chlorate, 1 liter of water. Heat in steam bath or double kettle in glass or porcelain vessel till dissolved. Apply one coat hot with clean brush.

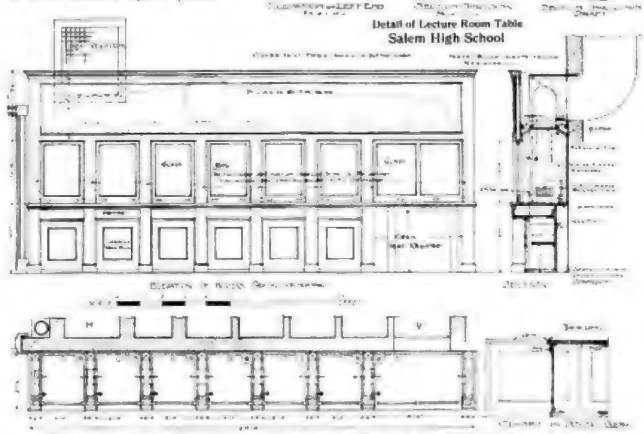
Second Coat. 150 grains of aniline hydrochlorate, 1 liter of water. Dissolve same as above. Apply three coats with a clean brush, each coat to become thoroughly dry before applying next. Color will become green when first applied, but in several days will turn a dead black. Allow material to thoroughly dry and wipe bench tops with linseed oil. The above quantities will cover about 5 square yards.

Science Lecture Room, High School of Commerce, Springfield, Mass.
Kirkham & Parlett, Architects



Detail of Lecture Room Table
Salem High School

Slate or soapstone tops are occasionally provided and have the advantage of presenting a neater appearance, but the bill for breakage of glass apparatus is higher and they are less easily removed. The appearance of a laboratory rests mainly with the instructor. In some laboratories the woodwork is stained and corroded by acids after a year's wear, while others retain their first freshness through a considerable period of time. Soapstone sinks are arranged in the form of a continuous trough or individual sinks. The long trough is adequate for teaching elementary chemistry and is less expensive than the separate sinks. It should be at least 8 inches wide, 6 inches deep at the upper end and 8 inches deep at the lower.



Detail of Hoods Over Sinks, Chemistry Laboratory, Haverhill High School, Haverhill, Mass.
Kilham & Hopkins, Architects

Reagent shelves are generally provided, running longitudinally in the center, 10 or 12 inches above the desk, supported on metal standards. This shelf should have an acid-proof surface, which is sometimes accomplished by giving it a surface of plate glass, clamped firmly to the wood, which may be painted white under the glass. Others prefer to keep the reagents in cases at the ends of the working desks; but the general tendency is to eliminate all unnecessary complication of the laboratory equipment and in many modern schools the shelves are being omitted entirely.

In addition to the plumbing the desks are equipped with gas, alternating and direct electric current, steam and compressed air, located as shown in the accompanying drawing.

Some teachers like to have a space in the laboratory equipped with a demonstration desk and about twenty-four tablet chairs where the section can assemble for instruction before going to the tables to perform the experiments. A "battery" of triple blackboards may be located behind the demonstration desk.

For use in experimenting with substances which produce noxious gases, a half dozen or more hoods are provided at the side of the room. These are best lined with white tile, with slate or red tile floors and sliding glass fronts. The space above the opening may be utilized for a blackboard. Electric light and gas outlets are provided in each hood, or, if desired, the electric light may be hung outside each window. "Down draft" ventilating outlets are sometimes built in the pupils' tables with movable hoods to fit into them, but their use is scarcely necessary and tends to complicate the equipment.

Wall benches are often provided for special or additional students, provided like the other tables, with gas, electricity, etc., and copper sinks, which are made removable so as to gain additional working space.

A good sized soapstone sink is also desirable with draining pegs above for drying beakers and test tubes.

The teacher should be provided with a private office fitted up with a laboratory, table, space for a desk, etc., where he can prepare his lecture apparatus and work on experiments without danger of disturbance. The motor generator set is sometimes located here.

The Science Lecture Room. Adjoining the chemistry laboratory, and separating it from the physics laboratory, is located the lecture room, which should accommodate from forty-eight to one hundred and twenty pupils in seats raised in an amphitheater in such a way as to give them the best possible view of the lecturer and the demonstration desk. Behind the desk one or two hoods should be located and a battery blackboard, and, if the room is located in the upper story, a skylight may profitably be placed directly above the lecturer. In fact, outside window light is not necessary for this room. The best arrangement is undoubtedly to have the room lighted from one side so that the pupils face parallel with the light; but if the rise of the bank of seats is high enough to prevent the light from shining directly into the teacher's eyes, the windows may be located behind the pupils.

As a stereopticon will often be used in connection with science lectures, a space should be arranged for one at the rear of the room with receptacle for plugging in for electric current and a concealed signal system operated from the demonstration desk. To ensure absolute darkness for the stereopticon, the windows, skylights, and glass panes in the doors, if there are any, should be equipped with light-proof black shades, running in grooves, which effectually prevent the entrance of any light. Some time is lost and confusion caused by sending pupils to draw these shades, which may be prevented by operating the cords by a small electric motor controlled from the demonstration desk.

This desk (see drawing) is about 15 feet long, 3 feet wide, and 2 feet 8 inches high, with splined pine top and a sink of two depths, placed at the right hand end facing the pupils. A dished soapstone slab covers about 5 feet of this end of the desk. Electric receptacles and gas cocks are provided, together with steam, compressed air, a down draft outlet with cover, a pair of brass standards 4 feet high with adjustable clamps for a horizontal bar, and switches for controlling the lights in the room, the stereopticon, and the curtain motor. Cupboards and drawers and the switchboard cabinet are arranged underneath. All connections of any sort for apparatus used in experiments should be placed in the demonstration desk to avoid the necessity of stretching wires, etc., across the space between it and the wall. On account of the large number of pupils to be accommodated, this room should have two doors to the corridor.

Dark Room, etc. A dark room, with sink for use in photography, should be provided, and a photometry room, with a table allowing a free length of at least 14 feet.

Storerooms. Ample storage space with shelving and glass cases is needed for valuable chemistry and physics apparatus, and this should be located adjacent to the lecture room and laboratories. A few schools go so far as to provide a straight railway track the entire length of the science department so that a table may be arranged for a lecture and then wheeled directly in; but this requirement is one which but seldom confronts the architect.

The Physics Laboratory. The physics laboratory requires room for six strong tables, each 4 by 6 feet, giving space at each for four pupils to work and fitted with gas, electric current, compressed air, etc., as in the chemistry laboratory. Wall tables are located around the room on sides where there are windows. They are equipped with gas, electric current, and cold water supplies and drains. In order to save space movable copper sinks are made and arranged to fit into the holes leading to the drains. When not required they may be removed, allowing use of the bench for other purposes. Instead of double tables the "one-way" system is sometimes installed also in physics laboratories, allowing all pupils to face the front of the room, with corresponding gain in efficiency.

Another system sometimes adopted is to equip the physics laboratory with tables of ordinary height (30 inches), arranged in U-shape, at which pupils may sit in common chairs. These tables have gas and electric outlets, but no high cross bars. Rooms so arranged have a very attractive appearance.

The Biological Laboratory. This is often equipped with low, glass topped tables seating two pupils each, some built-in glass cases and drawers, an aquarium, and a large marble sink in two depths. The room may well have a southern aspect and be equipped with a small conservatory for the observation of growing plants. A demonstration desk fitted up similarly to one for chemistry is sometimes, but not often, provided.

Diagrammatic Progress Schedules.

PART II.

By CHARLES A. WHITTEMORE.

THE diagrammatic progress schedule, as has been previously outlined, may be of inestimable value to all of those interested in the construction of modern buildings from a residence to the largest commercial enterprise.

It is also of interest to all of the individual contractors, sub-contractors, owners, architects, and real estate men from the standpoint of economy and efficiency, in economy both of time and of construction, and efficiency of administration.

The general contractor in first approaching a problem of this kind would naturally ask how he may benefit by the adoption of what might seem at first an added burden to his clerical force, and without some satisfactory solution of this problem and without some sufficient representation to him that he will directly benefit thereby in a manner distinctly proportionate to the cost of maintaining such a system, he naturally would be reluctant to assume charge of a schedule of this character.

It appears, however, upon close examination of the subject and study of the construction of various buildings, that the contractor does benefit by it to a large degree — to a larger degree, in fact, than from any other one method of checking up his work, and this we believe can easily be demonstrated.

Each general contractor of any size has a distinct organization which is composed of two parts: the clerical part or office force, and the administrative part or superintendents and foreman. These two units co-operate in the endeavor to carry out contracts under their charge, and the work of one part is known to the work of the other branch of the organization in the majority of cases only through personal contact. This involves expenditure of considerable time on the part of the intermediary in the nature of visits from the building to the office, or to the building from the office, purely for the purpose of explaining certain things which cannot be readily communicated by telephone or letter.

It is true that a representative of the office force, which in a great many cases is the general contractor, makes continual visits to the various buildings and keeps in personal touch with the different items; but where an organization is of sufficient size to control many projects, a casual examination on the part of the general contractor in visiting a building undoubtedly may result in several things being overlooked which might be of vital importance in the saving of a few days in the construction of the building — and each day means dollars.

It seems apparent, therefore, that a general contractor who depends entirely upon communication by telephone, letter, or personal visit is restricted in the amount of work he is able personally to supervise, and without his personal supervision the work for which he is directly responsible undoubtedly will suffer to a certain extent.

It is of extreme importance, therefore, that some means be devised for apprising the general contractor himself, or his office force, of the exact status of all the different contracts under their control, as well as of all of their own work at any particular time. To accomplish this result the diagrammatic progress schedule serves admirably.

It is not necessary that the general contractor increase his clerical force in order to maintain this schedule up to the minute, nor is it necessary that he put an additional man on the building; it is only necessary that the man on the building having charge of this schedule apply himself for a few minutes a day to the maintenance of this system, and this can be done as has already been demonstrated in actual building construction without loss of time from any other necessary labors.

It then seems that, if a simple system of this character can be operated without an increase in the office force and without any loss of time from other duties on the part of those already employed, the reasons for its use are sufficiently obvious, even though it should not serve the contractor to the fullest capacity of which it is capable.

Another consideration which is of vital importance is that by the progress schedule the contractor can control more exactly, more efficiently, and more readily the actual receipt and delivery of materials required; for example, if the contractor finds that his excavation has advanced beyond the point at which he expected it to be on a certain date, and can see by the character of progress on his progress schedule that the work is likely to continue at the same rate of speed, he can immediately order materials to be delivered at a date prior to the date originally set.

The contention may arise that this can be done anyway, and this contention is perfectly sound; the progress schedule is not supposed to do things for the contractor which cannot be done by other means. It is, however, supposed to do things for the contractor in a way which will save the contractor both time and money. So that while the contention is sound that the work above noted can be done in another way, it cannot be done as efficiently or as inexpensively, nor can it be done with so little effort on the part of the various hands through which the orders pass.

This follows also through the problem of construction, as has been previously noted, on busy or congested streets by arranging the progress schedule and prearranging dates and times of delivery, material, men, teams and all can be at hand at the exact moment required.

Countless times during the course of construction of buildings the contractor or his foreman has been on the site of the building and has asked the question: "Where are the teams to do this or do that?" or, "Where are the floor construction men that were to be here to-day?" The answer in the majority of these cases is that the notification had come to them at such a short time in advance that they had not been able to get their material and men together so as to appear promptly. This contingency can be avoided by a proper use of the progress schedule.

The effect of the progress schedule in controlling the work of sub-contractors is one of its most important functions to the general contractor. The condition is frequently met where material is required at the site of the building, the preparations are already made for its installation, but no material of this particular kind is at hand. Investigation reveals the fact that the material is being prepared in a certain foundry or mill and that the mill has not yet been able to get out this particular product. This immediately becomes an incipient delay. The contractor's only recourse then is to wait until such time as the material is prepared and at hand, and the natural and inevitable consequence of this is that men are idle or employed on other parts of the work when they should be attending to this particular duty. The use of the progress schedule would absolutely eliminate conditions of this kind if it were properly and intelligently employed. Each sub-contractor would be required to have a progress schedule of a similar character to the one employed by the general contractor, and would be required to forward to the general contractor copies of this schedule from time to time which would show him at a glance the exact condition of all of the work in foundry or mill, and would enable him at once to determine whether or not the material would be forthcoming at the particular time it might be in greatest demand.

The progress schedule is of tremendous value to the general contractor in the question of dispute as to delay. If this system is accurately and consistently maintained, it will demonstrate at a glance at which portion or at which stage of the work the delay occurred, and will demonstrate beyond reasonable doubt whether or not the general contractor is entirely free from all blame in connection with this delay.

As a concrete illustration of the working of this, it might be well to refer to an actual condition which existed in connection with a building recently constructed. The general contractor in installing his foundation work, due to weather conditions and other causes, was at the time of completion of the foundations about six weeks behind his schedule; the steel work had been delivered and storage charges and railroad charges were held against the contractor. Upon completion of the whole building the contractor was eight weeks behind his original schedule. The owners claimed delay and the contractor refused to allow the claim and put in a counter claim that he had been delayed by the owners. The evidence, however, showed that the contractor was six weeks behind at the very start of the job and, inasmuch as no other legitimate claims of delay appeared, the contractor was naturally held responsible. A progress schedule demonstrated the fact that all of the other work during the course of the construction of the building had been kept up to the mark, but that the six weeks lost at the start had not been made up, and as this original delay was not due to any act of the owners, the entire responsibility rested with the contractor.

In cases where the progress schedule has been maintained, it is the custom for the general contractor shortly after the contract is signed to file with the architect a schedule of dates of commencement and completion of the various sub-contracts which come directly under his control. Figure 1 shows a reproduction of such a schedule and is, in a measure, self-explanatory.

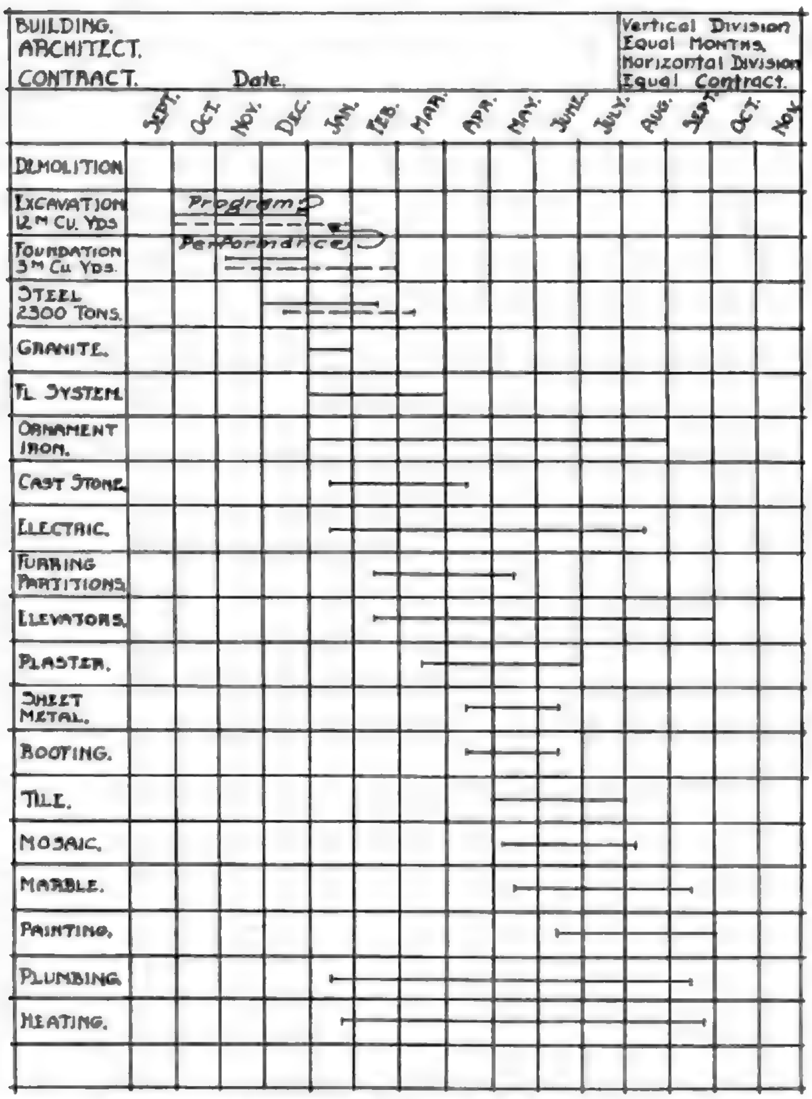


Figure 1. Type of Schedule Adaptable to Uses of the General Contractor to Indicate Completion Rather than Progress

With this as a starting point the general contractor may require from his sub-contractors similar schedules, which schedules are made parts of the contracts, and violation of the terms of the schedule are as subject to penalty as violations of the terms of the contract.

The advantage of this is sufficiently obvious, in that the general contractor has a continuous control over all of the efforts of the sub-contractors, both in the shop, the mill, and foundry, as well as at the building.

After the filing of the progress schedule with the architect by the general contractor, the architect arranges his own form of schedule, which he maintains independently of the schedule maintained by the general contractor. The general contractor, however, at the building arranges with his time clerk to check off day by day the various items as they appear in the nature of progress at the building.

This schedule may be kept on a transparent medium such as tracing cloth, and blueprints from time to time may be made from this original and sent to the architect and owner as a progress report.

In addition to the recording of work at the building, this progress schedule may be employed to the extent of noting and checking the receipt and delivery of drawings and other important information.

The general contractor, as a rule, does not recognize the fact that after the contracts are awarded to him, a certain amount of time is necessary for the architects to study and prepare the finished details and other explanatory drawings. The result frequently is encountered that the general contractor will make the claim, as sustaining his contention that he is not responsible for delays, that the architect did not give him information in time, or did not supply him at proper times with drawings. The architect, on the other hand, would naturally controvert this claim by the statement that the drawings had been properly delivered, and without a proper system on the part of both the architect and the contractor it would be pretty difficult to arrive at the correct solution of this problem. The progress schedule, however, would enable the contractor to follow carefully this part of his work — and the receiving of drawings and information, as well as the imparting of such information as may be necessary, is as much a part of the general contractor's work as the receiving of a steel beam — in such a manner that a record of drawings can be accurately and consistently kept, and thus entirely eliminate any possibility of argument from the standpoint of delay due to tardy information.

It is also advisable at the time of signing the contracts for the contractor, in giving his progress schedule to the architect, to receive from the architect a similar schedule of drawings to be delivered. This the contractor should insist upon, as he may then make his plans for the disposition of certain parts of the work with greater accuracy than would be possible if he had no idea as to when drawings and details of certain portions of his work would be available. Not only for himself is this schedule an advantage, but also for his various sub-contractors. The mill man may be anxious for details in order to get out his frames; the general contractor can merely say that he has not yet received the drawings and is not positive when he will get them, but will forward them to the mill man as soon as possible; whereas, if a schedule of

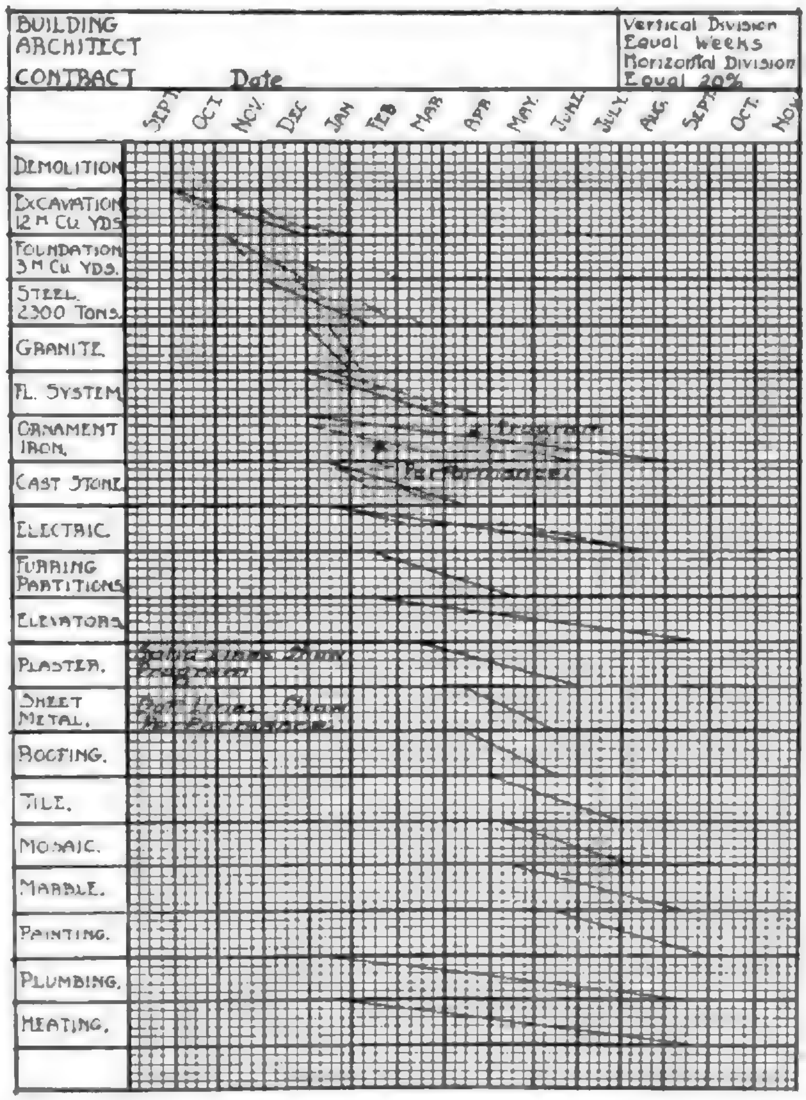


Figure 2. Type of Schedule Where Progress of Work may be Checked and Rate of Speed Noted on Various Contracts

drawings were maintained, he could notify his mill man as soon as the contracts were made that the drawings would be delivered to him on such a date. In this manner all of the different contractors interested in the completion of the building would be apprised in advance of the dates when their information should be forthcoming, so that they might proceed with their work without delay.

In arranging a schedule which is available for a general contractor and for a general contractor alone, there are many items which do not enter into the schedules of the various sub-contractors. On the other hand, the fundamental underlying principle is the same, and the efficient service a progress schedule will afford a general contractor is afforded to the sub-contractors in the same relative degree.

The illustration, Figure 1, indicates the type of progress schedule which is adaptable to the uses of the general contractor and is such a schedule as he would work out for consultation with the architects or owners. The disadvantage of this particular type, as will be readily seen, lies in the fact that the contractor cannot check proportionate progress of work. It does, however, give the limiting dates within which times certain contracts or sub-contracts or portions of the work are to be done, and if a progress schedule of this character is made a part of the contract or the specifications, it would become, within reasonable limits, a binding agreement.

In this type of progress schedule the heavy vertical sub-divisions represent units such as months and the lighter sub-divisions represent weeks or proportionate parts of the larger units. The horizontal lines may indicate proportion of work completed, but with this particular type the proportionate part is a little less readily indicated than in a type to be noted later.

Figure 1 illustrates the manner in which this record may be kept as a contractor's record, indicating completion rather than rate of progress. The heavy horizontal lines indicate the duration of each individual sub-contract, the beginning of the line representing the starting date and the end of the line representing the date of completion. The broken dotted line, which is noted to indicate how this schedule may be maintained, indicates the actual duration of the time of the contract, the starting point being date of commencement and the end of the line being date of completion.

This particular type of schedule is of use more as a record than as an actual check on the progress, and would be a convenient form to file for future reference after a building has been completed, but is not the highest type of progress schedule for current work. An illustration of a better type is given in Figure 2.

Figure 2 represents a modification of the former type and indicates in a measure how progress may be checked and rate of speed noted. This type, however, is not sufficiently flexible to serve all its purposes to the best advantage. It will be seen by comparing the lines indicating the prearranged schedule and the actual progress that the proportion of work done during any interval of time which indicates the rate of speed is more clearly defined than in the previous illustration, but a later schedule will show a still greater improvement on this particular type.

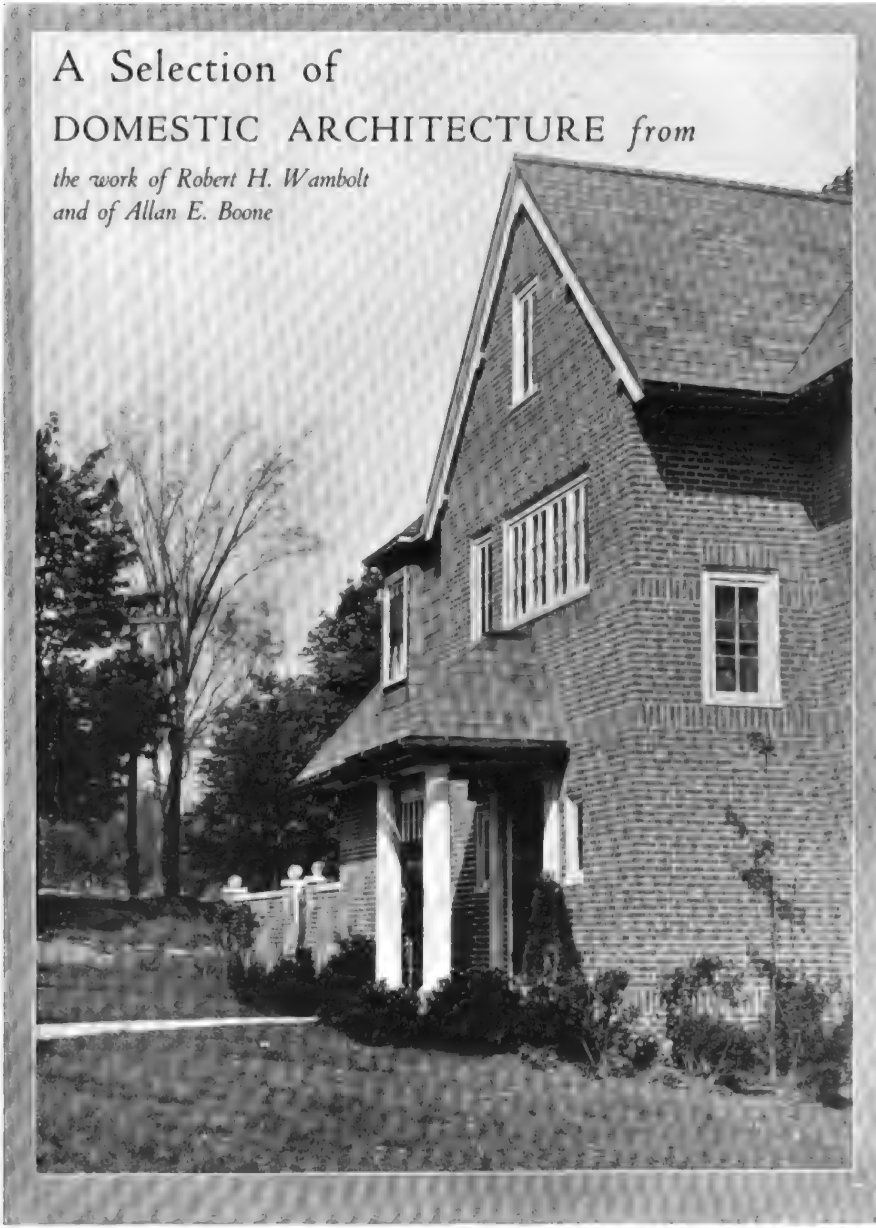
In Figure 2 the lighter vertical sub-division, as has been previously noted, indicates weeks and the lighter horizontal line indicates proportions of the total contract. The heavy solid line indicates the duration of the contract as prearranged by the contractor. The dotted line indicates the actual beginning, end, and duration of the work, and shows the relative progress. Reference to this illustration will show how readily the progress of the work may be noted, and also how readily may be noted the exact interval of time during which nothing was done on the particular contract in question. This point alone may be of vital importance.

This subject of progress schedule can be applied to the sub-contractor as readily as to the general contractor and with equal efficiency in assisting in the preparation of work and in the execution of the actual contracts.

It might also be permissible to call attention to the fact that a schedule of this character is equally applicable to any manufacturing enterprise. The systematic record of progress is not necessarily confined to architecture or building construction alone, but an analogy can readily be drawn between the output of a manufacturing establishment and the foundry of a sub-contractor in building construction; for example, in a mill producing woolen goods a progress schedule record could be kept as efficiently and to as good purpose as in a mill producing interior finish in connection with a building enterprise. This type of schedule would show the date that orders are received, the various sub-divisions of the work from the selection of the different kinds of material used to the packing and shipping of the finished product, the date of actual commencement of work on these orders, the progress of various portions of the work, and the date of delivery of the completed order. The question may arise as to what value this would be in an establishment of this character; but it seems sufficiently obvious that the head of the company, if he so desire, can by the assistance of the progress schedule, tell at a glance the rate at which orders are being executed, the way in which promises of delivery are being kept, and the amount of work that is being turned out by the various departments in an equal space of time. This, however, is not in the realm of architecture or construction and need not be further considered except as an analogy.

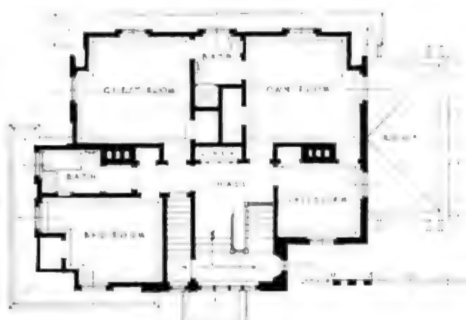
A Selection of DOMESTIC ARCHITECTURE *from*

the work of Robert H. Wambolt and of Allan E. Boone



VIEW FROM STREET

FIRST FLOOR PLAN

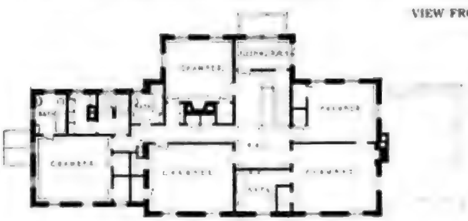


SECOND FLOOR PLAN

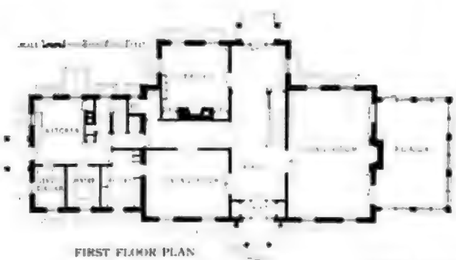
RESIDENCE OF WM. CRANE, JR., ESQ., WATERTOWN, MASS.

ROBERT H. WAMBOLT, ARCHITECT

VIEW FROM STREET



SECOND FLOOR PLAN



FIRST FLOOR PLAN

DETAIL OF ENTRANCE

HOUSE AT WINCHESTER, MASS.

ALLAN E. BOONE, ARCHITECT

which has been completed at a cost of about $500,000. Since, on first consideration, this cost may seem large, it should be explained that in addition to the regular dormitory accommodations in a fireproof building, there is also included a series of reception rooms which are intended to become the social center of the college. This necessitated a more elaborate interior and a larger building than for a simple dormitory, and, of course, increased the cost.

The college had established, up to this time, an accommodation unit providing for about one hundred girls in each dormitory, although out of this were always taken rooms for five or six teachers, a room for the head of the house, and a guest room; while the tendency, as far as possible, seems to be to group a smaller number of girls in a building rather than to increase their number, yet in the matter of food and service one hundred seems to be an economical unit. It was decided, since this building must accommodate two hundred girls, it should resolve itself into what may be called a double house, each half containing one hundred girls; and that these girls should meet on common ground in the dining room and living rooms, but that otherwise they should form separate units, having their own heads of houses, their own reception rooms, and being as independent of one another as though living in separate buildings.

View in Living Room, Showing Balcony and Alcoves
Central Dormitory, Wellesley College

The central dining room called for one common kitchen, both of which have been located in the basement. An interesting feature of the plan is that the service, not only for this building, but for the two other dormitories on the hill, is entirely underground and reached from a lower level, so that the grocers', butchers', and other service teams have no reason for entering the quad of the hilltop itself, but use the service court on a lower level.

In the examination of the remains of the old building it was found that the exterior walls had been made of excellent water-struck brick, the effect of which had been entirely ruined when they were laid, years ago, by reducing the joints to a hair line. By using those which were still in good condition, with wider joints and adding new black headers, one to every other brick in every other course, the architects have obtained

Fireplace in Dining Room

Detail in Living Room

Central Dormitory, Wellesley College, Wellesley, Mass.
Coolidge & Carlson, Architects

an entirely happy result and have added the sentimental value of knitting into the new building some of the old. The exterior stonework is an artificial product made with a white marble aggregate giving an agreeable color.

The interior finish throughout is of oak, no wood having been used, however, around the windows, where there is only the stone trim with the steel casements set in. The walls of the bedrooms are covered with burlap, so that pins can be stuck where the girls may desire. Each bedroom has a large chest seat in front of the window, a large closet, and on the closet door a full-length mirror. The lighting of the bedrooms is arranged so that there is a general overhead light, controlled by a switch near the door, and also a plug on each of two sides of the room, so that it is possible also to have table lamps. The floors of the dining room, corridors, and stairs are of cork applied directly to the reinforced concrete slabs, and are laid in 6 inch by 12 inch basket weave pattern of tiles.

View in Small Parlor
Martha Cook Building, University of Michigan

The toilets are so arranged on each floor that no girl has to walk more than 50 feet to reach one. The partitions and floors are all of honed terrazzo. The plumbing is installed on the basis of one lavatory, one water closet, and one tub to every five girls; if ten girls are to use the same toilet rooms, then the second bath tub is changed to a shower; and since the toilets are arranged for minimum groups of ten each, there is always at least one shower in each bathroom.

The heating is by an overhead low pressure system supplied from a central power house. The main rooms of the first floor and of the basement are heated by a fan system, the air being humidified by water washing. The kitchen has electric ranges and other general cooking equipment, the various kettles, however, being heated by steam.

In the basement, and easily reached from the main part of the house, there is a laundry with six tubs and a drying room, so that the girls may do their own laundry work if they so wish. In connection with the service entrance there is an office where the food and various other supplies, as well as express packages, may be received and checked. The basement also contains large storage places and is of sufficient height, so that a mezzanine may be added later if required. The trunks are stored in the attic where they may be reached easily.

At the University of Michigan the latest step in providing for the girl students is the residence hall known as the Martha Cook Building, and erected as a memorial gift to the university. It is one of a contemplated group of four buildings, all similar, and each to accommodate about one hundred students. Although not on the campus proper, it is immediately across the street from the main buildings and takes its place well as a part of the complete university group.

The dormitory floors are interesting in that they are so planned that the bedrooms although single are arranged in groups or suites of two or three with a private wash basin for each suite. This scheme, besides allowing flexibility, has the added advantage of making for quiet, since practically every room is thus separated from the corridor by two doors. There is also on each floor a general study room which, with a fireplace and special furnishings, affords an attractive retreat, while a small kitchen adjoining the study gives the the girls an opportunity to serve light collations.

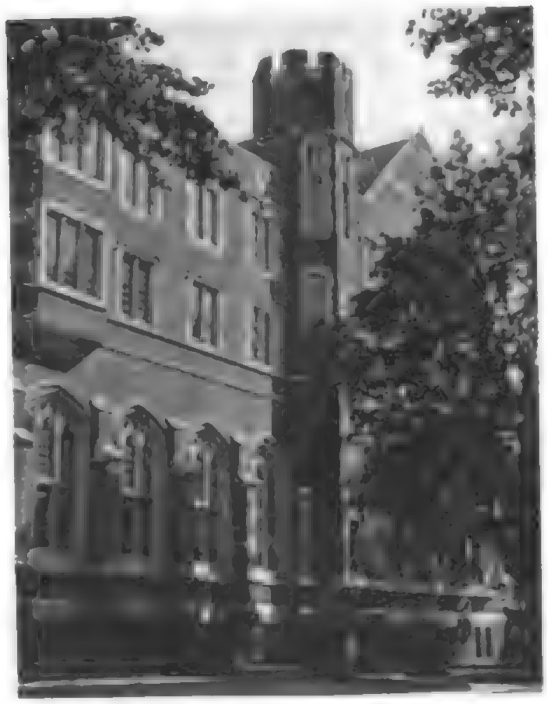
On the top floor there is a convalescent and hospital suite with a special diet kitchen so that any sickness, other than very serious cases, may be cared for right in the building.

On the first floor

View in Dining Room
Martha Cook Building, University of Michigan

are the usual general rooms — the parlors, dining room, and kitchen — and a living suite for the warden as well as a room for the housekeeper and a guest room. The small alcoves indicated on the plan as lobbies are really small reception rooms used for the entertainment of guests. An especially interesting feature of this floor is the long corridor which, with its comfortable furniture and pleasant outlook, practically serves as a living room.

The paneling is, in general, of American oak, although Philippine teakwood has been used in the large parlor and butternut in the small parlor. The floor of the corridor is of tile set within marble borders; the other floors in the principal rooms are of cement, except in the dining room, where a cork tile has been used. The ceilings of ornamental plaster are tinted an ivory tone. A great deal of care and attention has been given to the furnishings, not alone to have them harmoniously in good taste, but they have been especially made in the expectation that they will thus stand long usage.



Detail Showing Dining Room Windows
Martha Cook Building, University of Michigan

The exterior of the building is of red brick with limestone trimmings, while the roof is slate. The carving of the quite Gothic main doorway and of the bosses which enrich the mouldings at the third story window heads is worthy of particular notice. The terrace extending along the inner side of the building is an interesting feature in that it provides an out-of-doors sitting place which will undoubtedly be greatly appreciated during the warmer months of the school year.

The whole effort in the somewhat free spending of money on this building was to create an atmosphere of solid substantiality, in the realization that such surroundings must have a healthy influence on the minds of the students at a time when such an influence is most necessary.

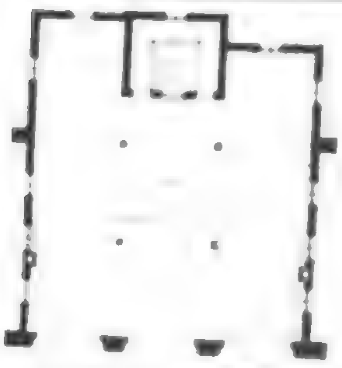
View Showing Terrace Side
Martha Cook Building, University of Michigan, Ann Arbor, Mich.
York & Sawyer, Architects

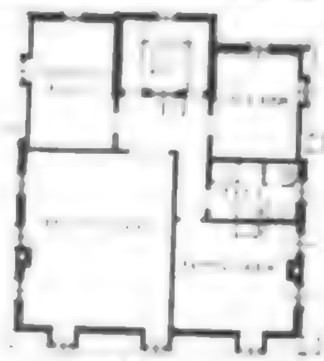
ENTRANCE ON CAMPUS FACADE

SKINNER RECITATION BUILDING, MT. HOLYOKE COLLEGE, SOUTH HADLEY, MASS.

PUTNAM & COX, ARCHITECTS

VIEW OF STREET FACADE



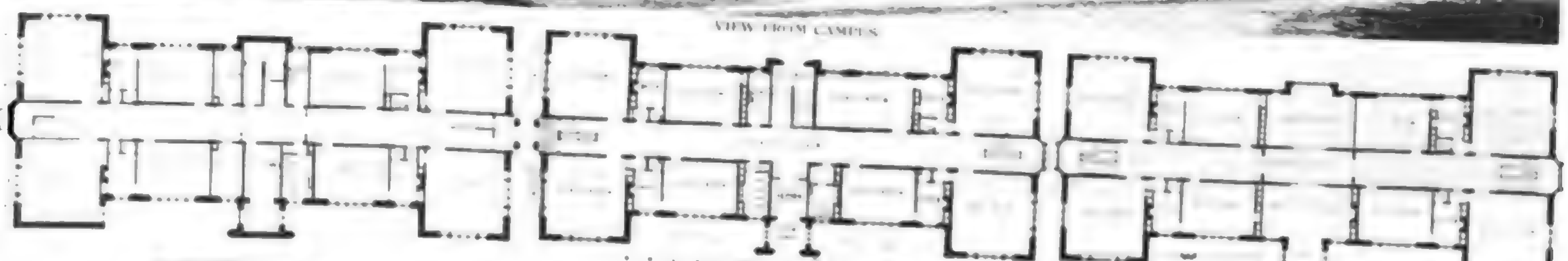


VIEW OF REAR SHOWING HOSE TOWER

FIRE STATION, WESTON, MASS.

ALEXANDER S. JENNEY, ARCHITECT

VIEW FROM CAMPUS



BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

SECOND FLOOR PLAN

SKINNER RECITATION BUILDING, MT. HOLYOKE COLLEGE, SOUTH HADLEY, MASS

PUTNAM & COX ARCHITECTS

DETAIL OF END WING

MAIN ENTRANCE PORCH

SKINNER RECITATION BUILDING, MT. HOLYOKE COLLEGE, SOUTH HADLEY, MASS.

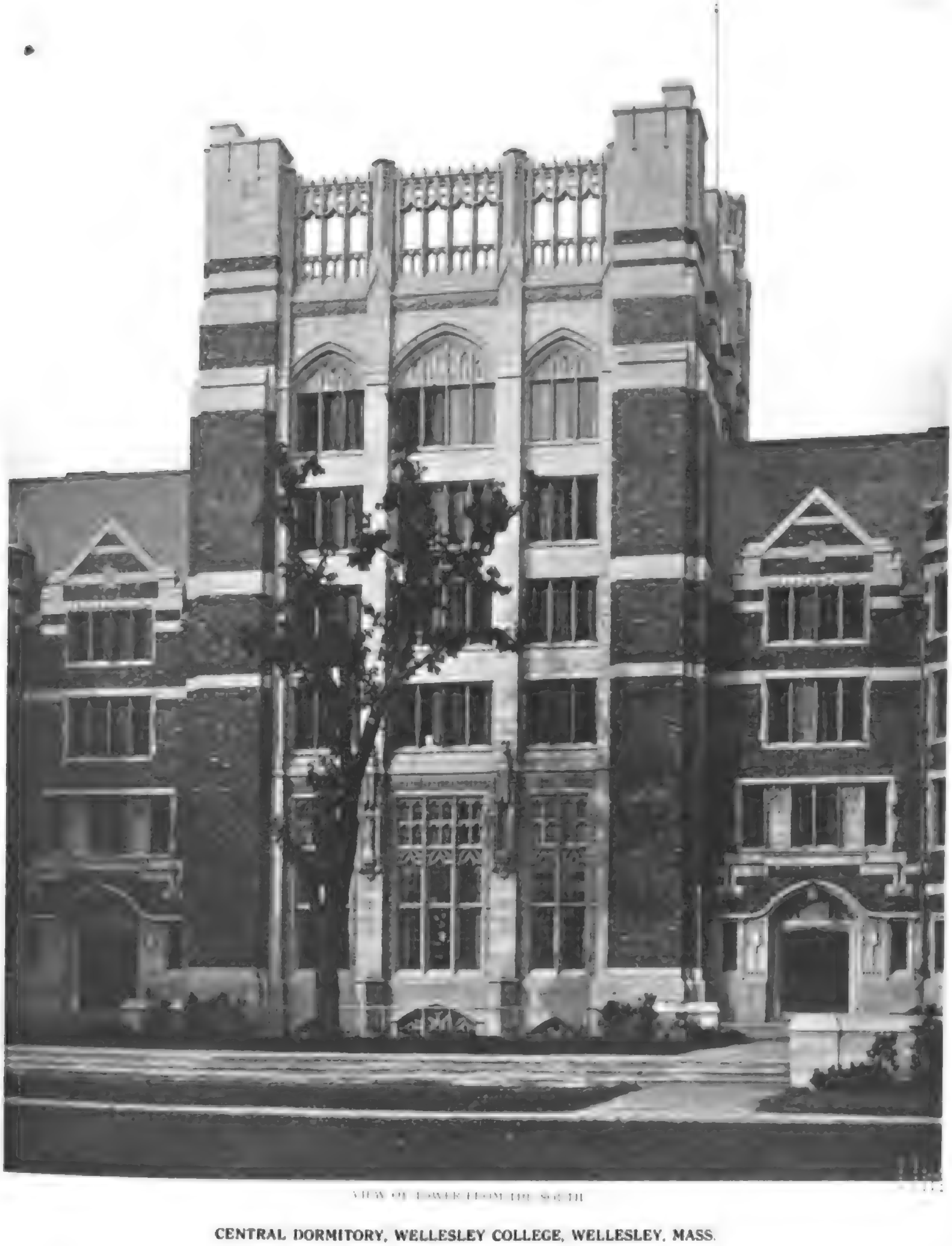
PUTNAM & COX, ARCHITECTS.

VIEW FROM STREET

FACULTY SOCIAL ROOM

SKINNER RECITATION BUILDING, MT. HOLYOKE COLLEGE, SOUTH HADLEY, MASS.

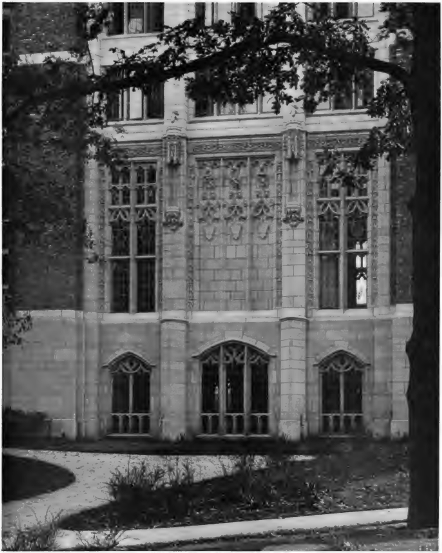
PUTNAM & COX, ARCHITECTS



VIEW OF TOWER FROM THE SOUTH

CENTRAL DORMITORY, WELLESLEY COLLEGE, WELLESLEY, MASS.

COOLIDGE & CARLSON, ARCHITECTS



DETAIL OF LOWER STORIES ON NORTH SIDE OF TOWER

CENTRAL DORMITORY, WELLESLEY COLLEGE, WELLESLEY, MASS.

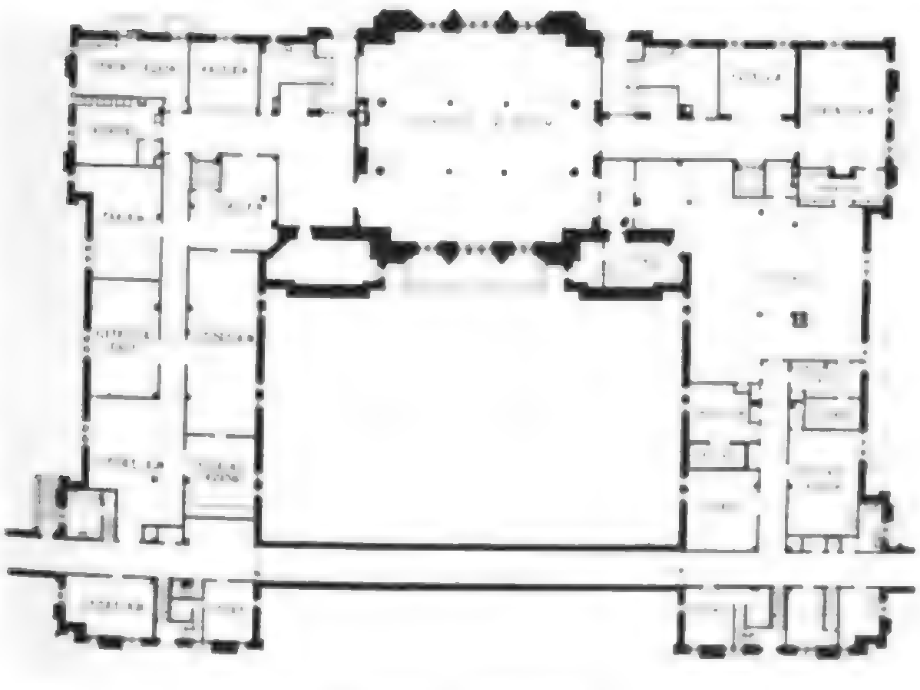
COOLIDGE & CARLSON, ARCHITECTS

ENTRANCE ON SOUTH FACADE

CENTRAL DORMITORY, WELLESLEY COLLEGE, WELLESLEY, MASS.

COOLIDGE & CARLSON, ARCHITECTS

GENERAL VIEW FROM THE SOUTH



BASEMENT FLOOR PLAN

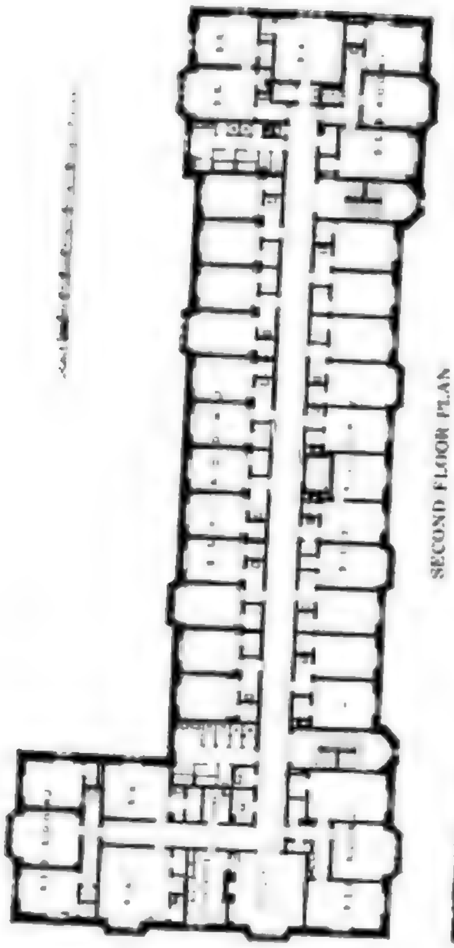
FIRST FLOOR PLAN

CENTRAL DORMITORY, WELLESLEY COLLEGE, WELLESLEY, MASS.

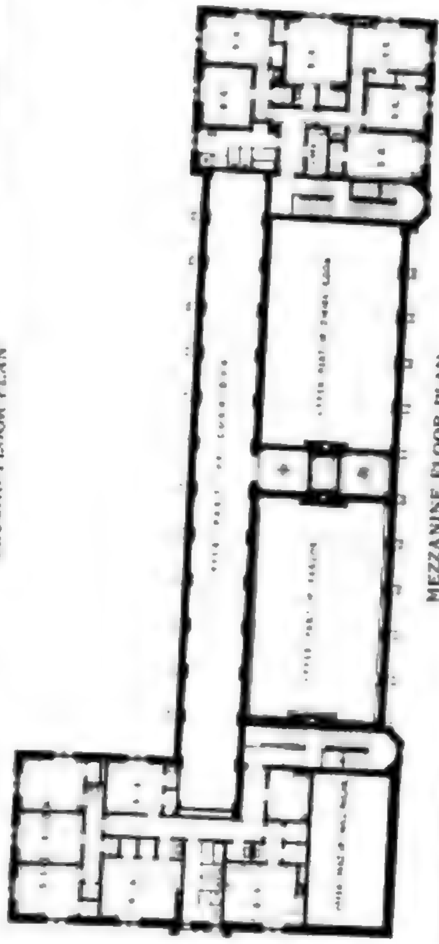
COOLIDGE & CARLSON, ARCHITECTS

MARTHA COOK BUILDING, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.

YORK & SAWYER, ARCHITECTS



SECOND FLOOR PLAN



MEZZANINE FLOOR PLAN

FIRST FLOOR PLAN

VIEW SHOWING SIDE ENTRANCE

MARTHA COOK BUILDING, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.

YORK & SAWYER, ARCHITECTS

DETAIL OF SIDE ENTRANCE.

DETAIL OF MAIN ENTRANCE

MARTHA COOK BUILDING, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH

YORK & SAWYER, ARCHITECTS

VIEW SHOWING FIREPLACE IN LARGE PARLOR

VIEW SHOWING CORRIDOR

MARTHA COOK BUILDING, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.

YORK & SAWYER, ARCHITECTS

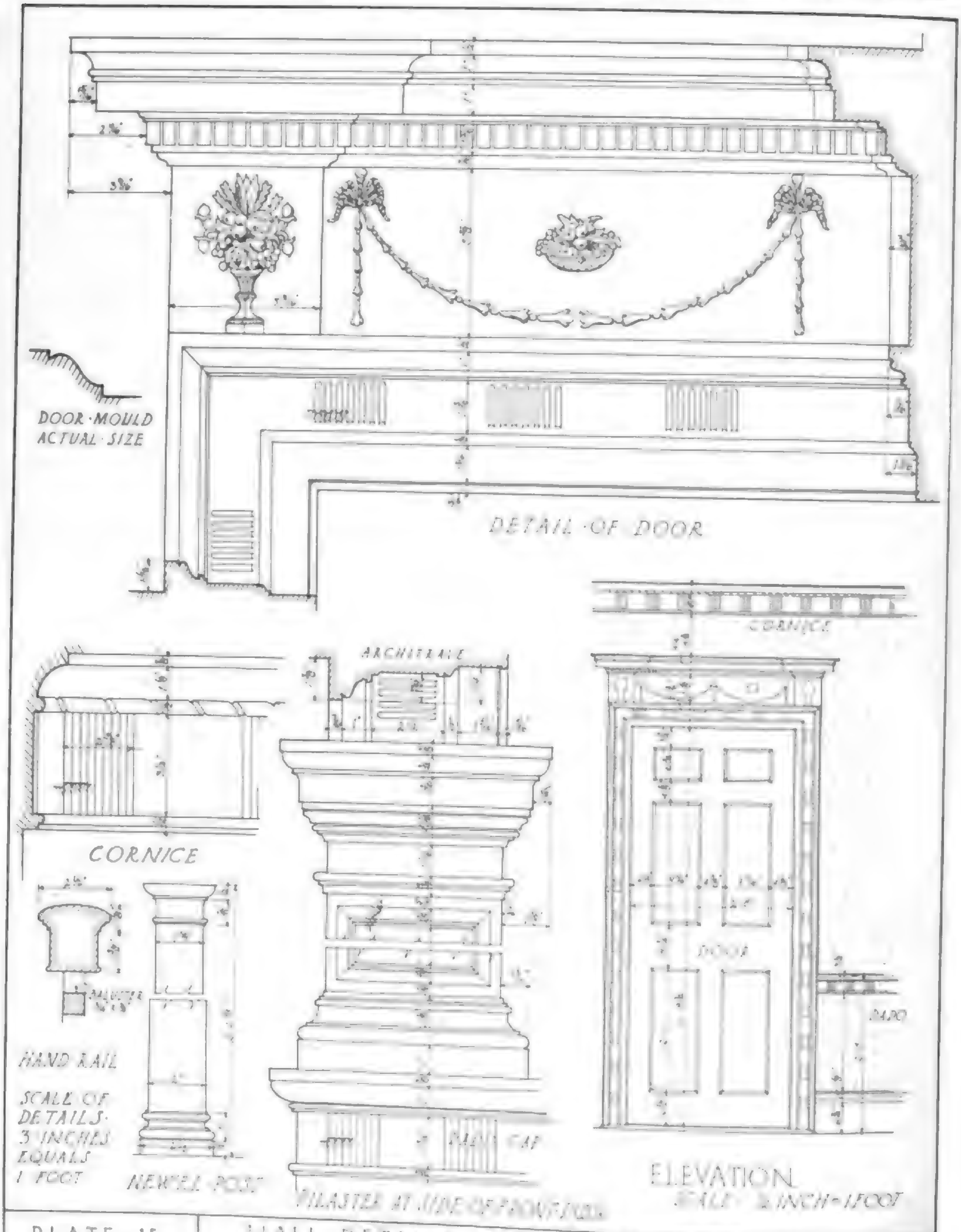


PLATE · 15
FEBRUARY · 1916

HALL · DETAILS · CROWNINSHIELD · DEVEREUX · HOUSE · SALEM · MASS ·
SAMUEL · MCINTIRE · ARCHITECT · DATE · 1805

MEASURED · & DRAWN · BY GORDON · ROBB

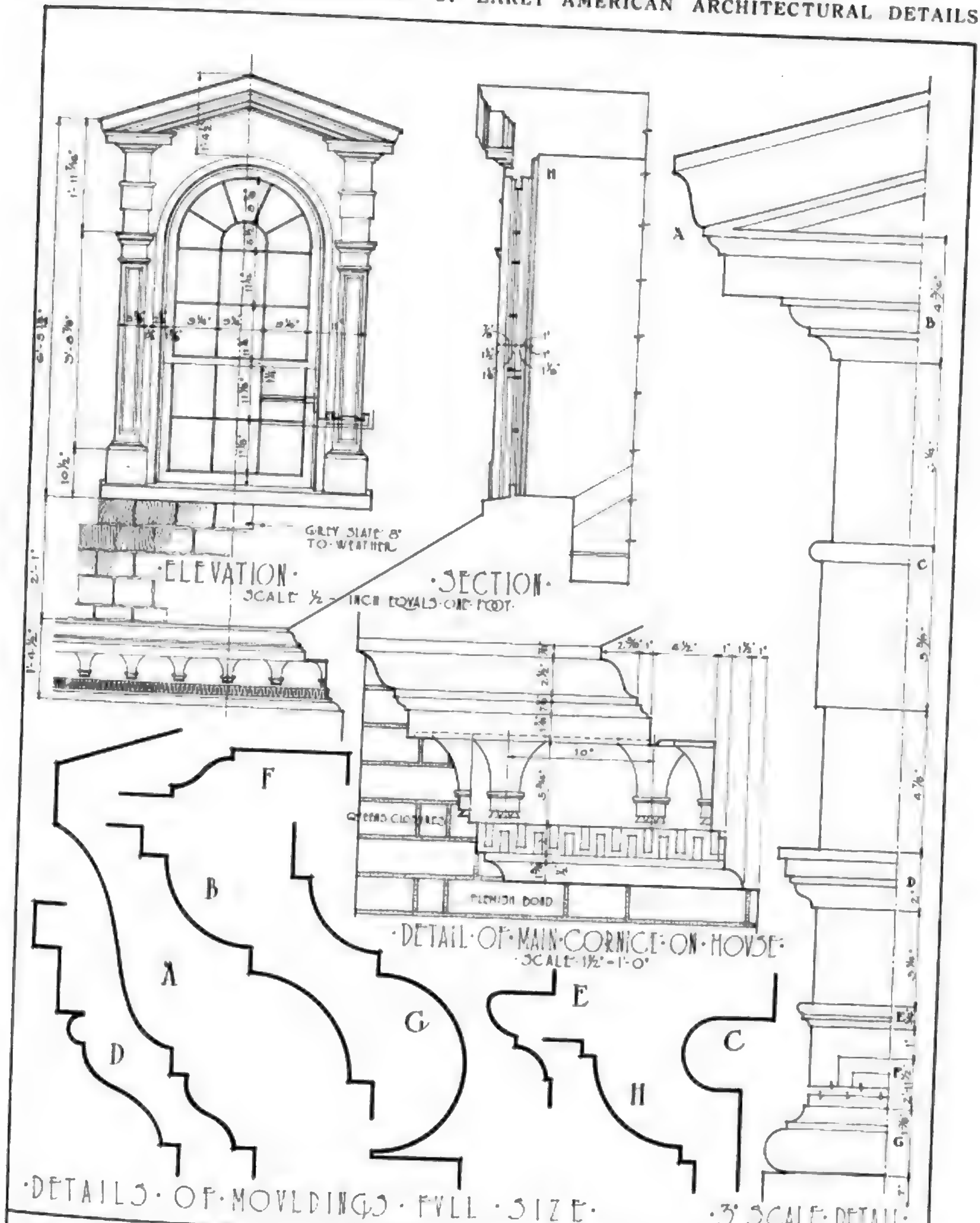


PLATE 16 FEBRVARY · 1916	·DORMER - SNOWDEN HOVSE - ·ALEXANDRIA·VA· ·DATE · 1790 · ·BVILT·BY·THOS·VOWELL·	MEASVRED & DRAWN BY J·L·KELSTER·O·J· MVNSON & J·A·WEBER

PLATE SIXTEEN.

THIS example of small town house is quite typical of those built in Alexandria during Colonial times. It is so located that the front commands a beautiful view of the Potomac River. The brickwork of greatly variegated tones of red and brown gives a rich, contrasting background to the white woodwork of the doorway and the stone trim of the windows. The dormers are particularly interesting with the pleasing silhouettes formed by the pediments; their sides and roofs and the roof of the house are covered with gray slate. The exceptionally good cornice is of the type that is most characteristic of those used during the Colonial period.

SNOWDEN HOUSE, ALEXANDRIA, VA.

MEASURED DRAWING ON PRECEDING PAGE.

Some Italian Doors.

By JOHN H. SCARFF.

Accompanied by Measured Drawings by the Author.

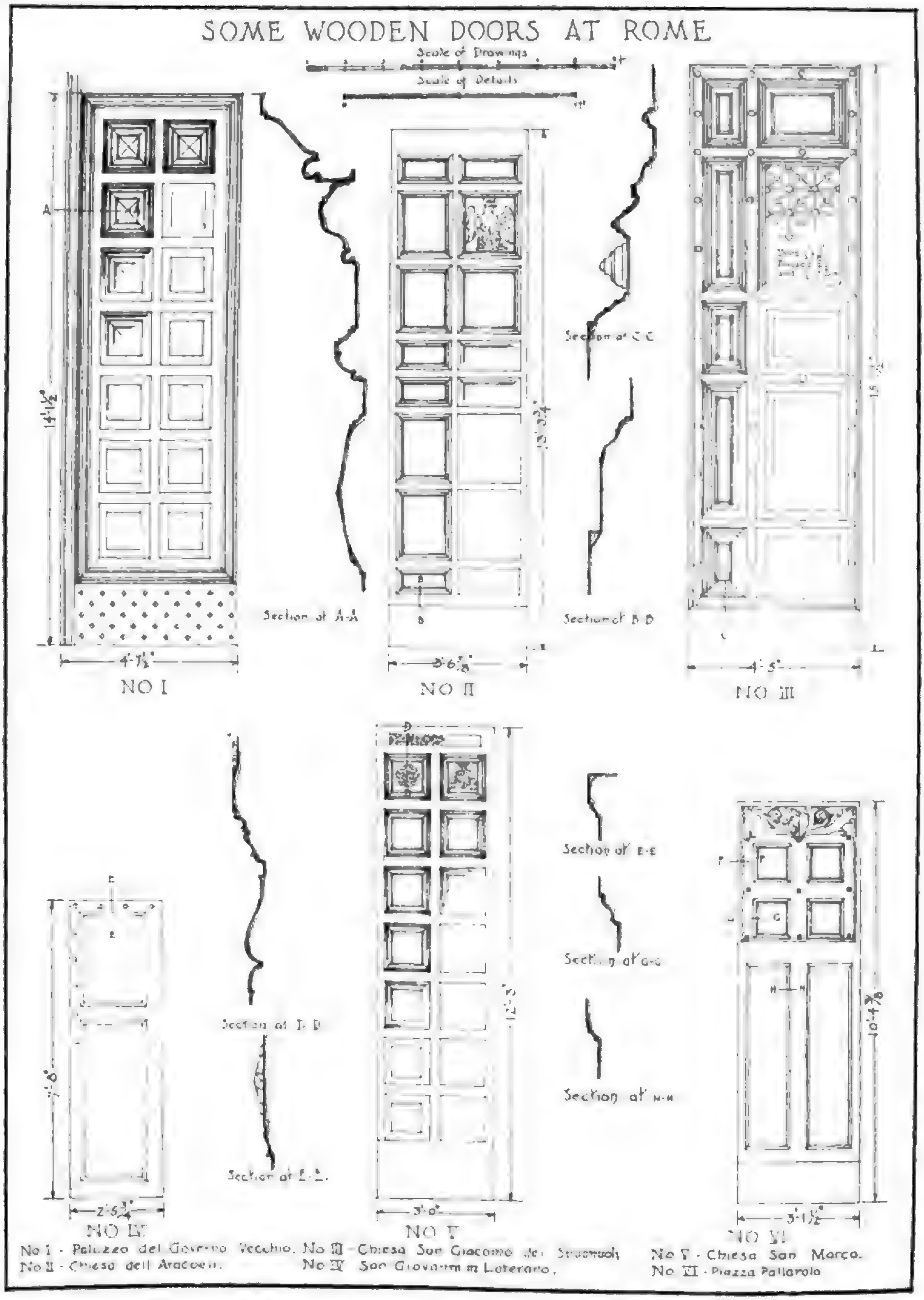
THERE are few matters regarding art more worthy of consideration than the narrowness of the limits that bound human invention, but within those limits the range of the imagination is infinite. To-day we return to the old types of classical art and it seems at first sight as if there could be nothing new under the sun; as if the imagination, so fertile in creation during many centuries, had been utterly worked out and come to an end, and that there was nothing left but to repeat and copy what was done ages ago. But by the greatly increased number of materials and methods of working them the limits are extending far beyond our ability to assimilate, and the danger lies in mechanical and impersonal duplication. It is the increased demand and facility of production, by encouraging excessive speed, that causes the sterility of the imagination. Accepting the limits of material as fundamental, the range of possibilities is only set by our ability.

But two nations in the history of the world, Greece and Italy at the time of the Renaissance, have succeeded in giving to every one of their achievements the form of art. Nothing was produced in Italy between the thirteenth and seventeenth centuries, from the smallest objects of daily use to the palaces of princes, that did not bear the characteristics of a fine art. The doors shown in the accompanying drawings and photographs, chosen from an infinite number of possibilities throughout Italy, owe their distinction, apart from their pleasing and graceful proportions, to their strict adherence to structural limits and skilful adaptation of the materials. The wood doors show nothing but various combinations of rectangular panels with an occasional spot of carving, and the utilization of their structural nails and bolts as an element of interest and design. The metal covered doors, corresponding to the plebeian and unsightly kalamein of to-day, are of but two kinds, — those made up of large pieces of metal over the whole central portion of the door, with an all over pattern of nail heads fastening the metal to the wooden core; and those of small rectangular pieces of metal, whose meeting is covered by metal straps, and they in turn held to the wooden core by an arrangement of nails and bolts. In no case is there a moulding of any sort — no imitation of another material but a design resulting from the natural and sincere use of metal. The wood doors are usually painted a dark green and the metal almost invariably a sage approximating the color of corroded copper.

Doorway, Church of the Aracoeli

The political conditions of Italy at that time more strongly influenced architecture than any one of the other arts. Semi-fortified houses became a necessity, and throughout the most brilliant period of the Renaissance the country was swept over and over again by struggles and strife — not only trod by foreign armies and at times fearful of invasion from the east, but rife with political intrigues, plots, conspiracies, and the jealousies of citizen against citizen, party against party, and city against city. Constant revolution had destroyed the last vestige of feudalism. The counts had become citizens and the rural population ceased to rank as serfs. But the counts as city dwellers proved but poor neighbors. They fortified their palaces, retained their military habits, and carried on feuds in the streets and squares. Not content with rivalries and jealousies among the citizens themselves, cities became deadly enemies. Rome attempted to ruin Tivoli, and Venice to ruin Pisa; Verona fought with Padua; Florence and Pisa with Lucca and Siena, and during the thirteenth century Guelf and Ghibelline factions divided Italy into minute parcels. At last the rivalry of cities became so acute that the famous invitation to Charles VIII was sent by Ludovico, Duke of Milan, and Italy from that time was overrun by foreign soldiers and for many years was destined to exchange one set of masters for another.

In such conditions of turmoil, treachery, and


SOME WOODEN DOORS AT ROME
Scale of Drawings
Scale of Details
Section at A-A
Section at C-C
Section at B-B
NO I
NO II
NO III
Section at E-E
Section at G-G
Section at H-H
Section at D-D
NO IV
NO V
NO VI
No I - Palazzo del Governo Vecchio.
No II - Chiesa dell Aracoeli.
No III - Chiesa San Giacomo dei Spagnuoli
No IV San Giovanni in Laterano.
No V - Chiesa San Marco.
No VI - Piazza Pollarolo

crime, when statecraft was synonymous with treachery, Italian architecture was developed. Windows were grilled, heavy rusticated walls employed, and doors of heavy wood studded with iron to guard against the encircling foes that were even to be thought of.

Of the doors shown, No. I is at present the entrance to a public school in what was formerly an old palace on the Governo Vecchio, the main artery of traffic before the opening of the new Corso Vittorio Emanuelle between central Rome and the parts lying across the Tiber in the neighborhood of the Vatican. It is a large scale adaptation of the familiar square panel door, but here heavier than usual because of the development of the panel into a pyramidal form echoing the stone architrave around the opening. A wood frame runs around the entire opening, including both door and transom, and the whole design, as a glance at the larger scale section will show, is carried out with a great degree of refinement.

Doors, San Giovanni in Laterano

No. II is the door at the transept entrance to the Church of the Aracœli on the Capitoline. Here a delightful effect is obtained by very simple means. The pleasing arrangement of panels is saved from monotony by the addition of the two carved eagles. The section is quite simple and the doors are hung directly in the stone opening, with no wood frame to support them such as is shown in example No. I.

No. III occurs at the Piazza Navona entrance to the Church of San Giacomo of the Spaniards, where the discovery of America was first celebrated in Rome. It is a later and more developed design and shows the introduction of the decorated bolt head. The interior of the church is little known and rarely visited in spite of the fact that it contains an exquisite painted marble balcony of the early Renaissance, one of the most perfect bits of architecture to be found anywhere in an architect's travels.

No. IV is of bronze and not of wood, but is added because of the beautiful refinement of its simplicity. It is in a remote corner of the cloister of San Giovanni in Laterano and seldom seen.

No. V is one of the best examples of the simple, square panel type. The careful, small scale section gives a complication of lines that is very pleasing in so simple a scheme. With fine Italian taste the carving gives a distinction hard to equal. It is interesting and instructive to compare the relative scales of carving to panel-section here and in No. II. The door is to be found in the beautiful arcaded loggia of San Marco, almost opposite the new Victor Emanuel monument.

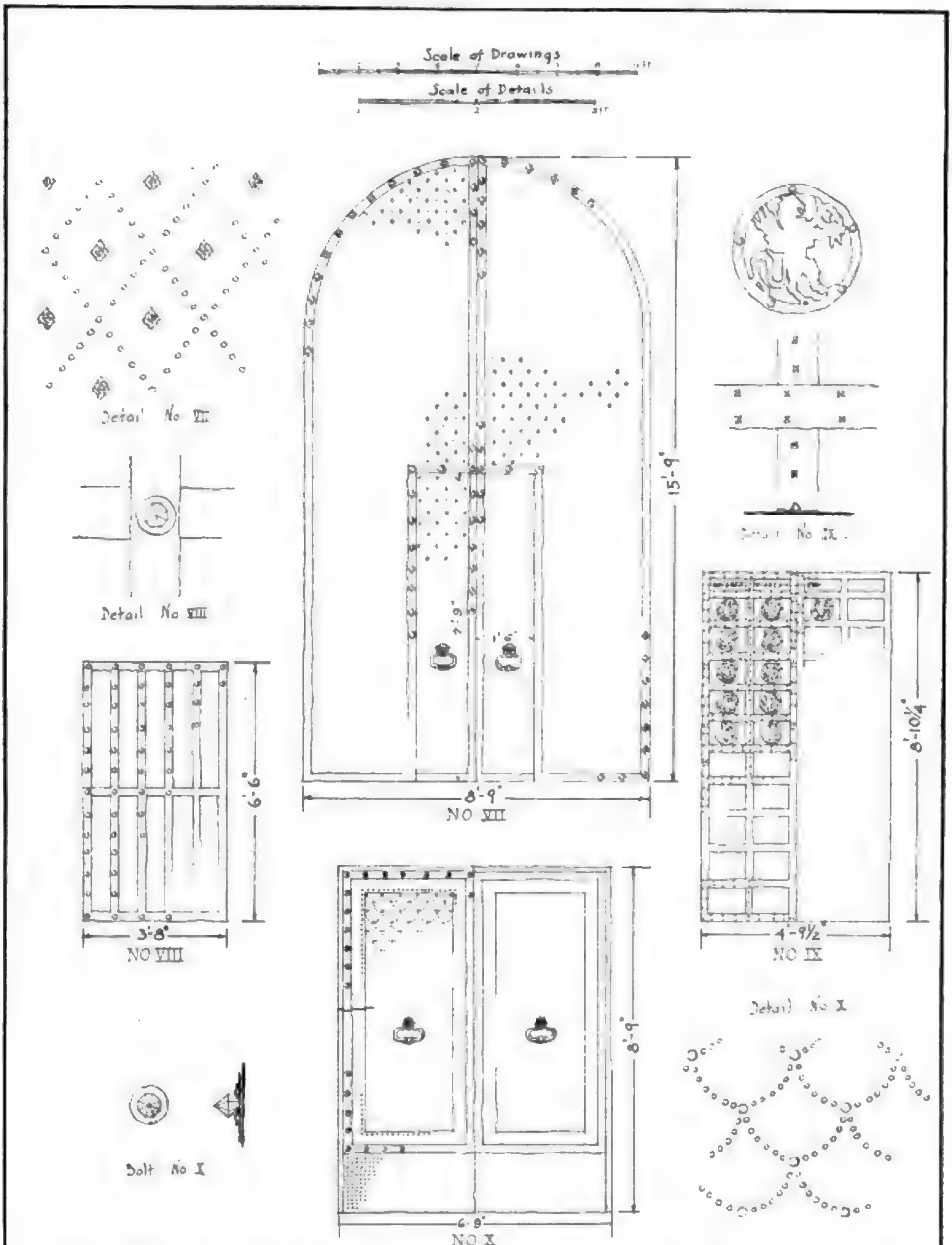
No. VI shows the entrance doors of an old palace on the Piazza Pallarolo near the Farnese palace, and is undoubtedly an alteration. Originally the door was of a scheme similar to No. V, the square panels making the entire door; but at a later date the lower and simple part was added, resulting in a very suggestive whole. The carving at the top has been much mutilated, and only enough remains to indicate the general scheme of decoration.

Nos. VII to X inclusive are some of the aristocratic ancestors of the modern kalamein. Unlike the later day variety which becomes, with

Doorway, Palace on the Governo Vecchio

Doorway, Church of San Giacomo of the Spaniards

Doorway, Palace on the Piazza Pallarolo



No VII - Palazzo, Via Garibaldi, Genoa.
No VIII - Cathedral of St. Mark, Venice.
No IX - Palazzo Pubblico, Perugia. (date 1550)
No X Palazzo, Via Garibaldi, Genoa.

battered and dented mouldings, so dilapidated and disreputable, these early doors seem designed especially for rough treatment and actually look better with the scars and bruises of age. They are of a type more often seen in northern Italy than in Rome. It is with the hope that they will prove suggestive to the modern architect with a similar problem that they are incorporated.

No. VII is the entrance door to a palace on the Via Garibaldi, Genoa. The small doors are arranged for ordinary purposes in an opening whose size is determined by the scale of the whole façade, and gives pleasing variety in what might otherwise seem a large and monotonous surface. The nails are not put in with mathematical accuracy, which gives a pleasing personal element.

No. VIII is a very small iron door to the right of the altar in the Cathedral of St. Mark's, Venice. This is an example, along with No. IX, of the metal plate covered by straps, and the lack of precision again adds to the charm. In this case the rusted iron surface is without paint.

No. IX is a further developed design with great distinction. It is rarely seen because to-day it is not used and is only found through a spirit of prowling investigation which in Italy is seldom unrewarded. It is the piazza entrance to the Palazzo Publico in Perugia. Apart from the design itself the variation in the size of the panels, the freedom from stiffness in the execution, and the appliqué all contribute to the pleasing effect of the whole. The metal straps are ⅛ inch thick, and the circular cut-out appliqués and the lettering at the top are from the same sheet metal. The straps are made up of different lengths, just as the material came to hand.

No. X, similar to No. VII, is also from a palace in the Via Garibaldi and is of a type quite common in Genoa. The additional relief given by the large handles is quite welcome on so flat a surface.

Such as these were the less important and inconspicuous doors of the Italian Renaissance. During that period of prodigious activity a whole people seemed to be endowed with an instinct for the beautiful and with the capacity for producing it in every imaginable form. On the smallest objects of daily use, saucepans and plates, towels and bed-covers, candlesticks and metal fixtures, floor tiles, a wealth of artistic invention was lavished by innumerable craftsmen not only capable of great technical skill, but distinguished by almost faultless judgment and taste. And to-day, in spite of centuries of war, robbery, and purchase, in spite of the tramping of foreign hordes over her plains and through her fair cities, Italy is still the treasure land of Europe and has abundantly to give to those that seek still the magic land of inspiration.

Doorway, Church of San Marco

Doorway, Palazzo Publico at Perugia

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IT has been said, and with considerable truth, that times and conditions create genius; that if we, as a people, should demand a Shakespeare, we would realize one. This is by way of illustrating the fact that, in the realization of any high standard of artistic expression, more depends upon the attitude of the public than upon individual accomplishments.

Those who are primarily interested in education along the lines of the pictorial arts, painting and sculpture, have realized that to cultivate a general desire for these things the best way is to look far into the future and to start with the citizens of that future as represented in the youth of to-day. Lectures with lantern slides, exhibitions of prints, and museum tours are among the many ways by which the school children of to-day are being brought to realize, at least partially, the purpose and scope of the fine arts and to appreciate what is good in these arts. The museums in the larger cities have definite departments and certain officials to attend to this particular phase of work.

While there is much encouragement for architecture to be found in these activities, since an appreciation of one art must react on the appreciation of the others, it is nevertheless unfortunate that there is not a more definite course being taken in respect to architectural education among the students in the high schools and higher grades of the grammar schools. To be sure, any such educational effort would have to be simple, for youth cannot be expected to appreciate, or even realize, subtleties of proportion, delicacy of detail, and the philosophy of expression. But neither can they understand harmony of color or grace of line in paintings and sculpture. The effort is not to create 100 per cent. artists or to give all the ability to understand completely; it is rather to give a realization that there are these higher expressions of life, a beauty from which man can derive pure enjoyment, and this purpose can be held in architecture as well as in the other arts. An admission of the value in such education is seen in the fact that music is taught to the young, so that by living in that atmosphere during impressionable years they may, practically unconsciously, acquire a sense of appreciation.

The educational efforts of the museums could easily include reference to architecture which would place this art in the minds of the coming generation not as a mere necessary housing of man, but as one of his several modes of artistic expression; while by the use of illustrations the eye could be cultivated to have a certain sense of architectural beauty, just as the ear can be made to appreciate harmonies of sound. Education along these lines would undoubtedly have a wonderful effect on the architecture of the future, for it would do much to bring about an appreciative public, demanding certain standards and able to damn those efforts which fall short. The great periods of art verify this, since in each case they have been at times when there was a very general understanding of architecture among the people.

The Chicago City Plan Commission has realized the importance of early education and a few years ago introduced into the grade schools a text-book on city planning. It is a very simple book, bringing out the essential reasons for and of good city planning and illustrating by historical examples the various points which are made. A large share of the book is, of course, given to the consideration of the Chicago plan, both in general scheme and in detail. It is realized that the working out of such a tremendous undertaking as the Chicago plan is a matter which will not take place during this generation and it is hoped, therefore, that when future generations are voting on questions of bond issues for this cause, they will better understand the purposes of their votes. Such must be the result, for though none of to-day's youth may remember that Major L'Enfant made the original layout for Washington or that Paris has a very excellent system of radial and circular streets, they all will realize that there is such an ideal consideration as city planning and that it is of value to all the community quite apart from the interests of any particular political party or ward organization.

MUCH encouragement is to be found in the compilation of building permits issued in various parts of the country during January. The totals, as compared with former years, would seem to indicate a return to the normal volume of business in construction work. Baltimore, Boston, Buffalo, Chicago, Detroit, Kansas City, Los Angeles, Minneapolis, Philadelphia, Salt Lake City, and Washington — to say nothing of such "war babies" as Allentown and Bridgeport — show marked percentages of gain over the amounts recorded in January, 1915. While a few cities, among which are New York, Pittsburgh, and San Francisco, show a loss, this may be regarded as accidental and due entirely to unusual local and transitory circumstances which cannot be taken as indicative of any general trend of business activity.

THE American Academy in Rome announces its competitions for the prizes of Rome in architecture, painting, and sculpture. Application blanks and other information concerning the date and places of the preliminary competition and the qualifications demanded of competitors may be obtained from the secretary, C. Grant La Farge, 101 Park Avenue, New York City.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

MARCH
1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING
ROGERS AND MANSON COMPANY PVBLISHERS

BALDASSARE PERUZZI

BORN IN SIENA, 1481. DIED IN ROME, 1536. ARCHITECT OF FARNESINA AND PIETRO MASSIMI PALACES IN ROME, POLLINI PALACE AND CHURCH OF SAN GIUSSEPPE IN SIENA

THE BRICKBVILDER

VOLUME XXV MARCH, 1916 NUMBER 3

Diagrammatic Progress Schedules.

PART III.

By CHARLES A. WHITTEMORE.

IN considering the value of a diagrammatic progress schedule to a sub-contractor the same facts present themselves as make this form of record of such importance to a general contractor. It is a well known fact that the majority of general contractors to-day are primarily executive officers and do not operate directly as a mason or a carpenter contractor, nor specialize in any particular branch of the building industry. Their chief function under these conditions is to correlate all the efforts of their various sub-contractors and keep the machine in regular, efficient operation. The general contractor is the producing machine, and the sub-contractors are the parts which make the machine capable of production.

It is the sub-contractor, therefore, whose efforts must be maintained at the highest point of efficiency in order that the results shall be in accordance with the contract expectations. Control of his organization and knowledge of his products and producing powers are as essential to a sub-contractor as is his ability to get business and make a profit, and only by efficient administration of his organization can this profit be commensurate with his efforts.

The various heads of departments in a sub-contractor's employ should be able at a glance to report exact information about any work passing through the process of manufacture, and should be able to keep in actual control of all the work under their charge in order to secure efficient co-operation from all the employees.

In order to determine what functions should be predominant so that a schedule will best serve the interests of the sub-contractor, it may be advisable to analyze the relations which exist in construction work between a general contractor and those to whom he sub-lets the various divisions of his contract not directly under his control.

As is only too well known to architects, the selection of sub-contractors by a general contractor is not always determined by their efficiency or the merit of their work; it is, in the majority of cases, a selection based on the price quoted for the work, even though the general contractor may accept a little lower standard and a little lower grade of work than from the next contractor who may be a little higher in price. This is one of the evils of the present so-called "competitive system" of estimating which comes beyond the province of this article. In cases, however, where contractors are selected from a list controlled by the architects and owners and where the sub-contractor is selected from those estimating, and the arrangement is made that the general contractor shall co-operate with the sub-contractors so selected in order to produce the completed building, the value of the progress schedule to the sub-contractor still maintains.

There are three results which a general contractor demands from each of his sub-contractors: first, promptness in delivery; second, quality in product; and third, accuracy in installation. These are not the only features of the contract between the two parties,—and, as has already been noted, the selection of the sub-contractor does not necessarily depend on these three features,—but are vitally essential, and of these, promptness in delivery is the chief desideratum in present-day construction. This is true from the standpoint of the general contractor, but is not the most vital consideration from the standpoint of the owners or the architect. Fortunately, however, it is also true that a sub-contractor who is prompt in delivery of material, but who maintains a low standard of quality of product and workmanship, is not likely to receive so many contracts as the one who combines all the three virtues noted above.

Inasmuch as a progress schedule cannot represent in any degree quality of material nor quality of workmanship, it is only with the phase of manufacture and delivery that a progress schedule as maintained by the sub-contractor can be of value to himself, to the general contractor, and to the architect.

The schedule, if properly and efficiently maintained, will show to the general contractor the progress which his sub-contractor is making in his preliminary work in the mills or foundry, in the actual production of the finished material, and also in the deliveries at the building. And it is not alone with the actual receipt of material that the general contractor is vitally concerned. The first wish of the general contractor is naturally to deliver the completed building to the owners at the earliest possible moment consistent with the standard of workmanship which his organization represents, so that naturally he would demand from his sub-contractors the most efficient and speedy deliveries which they are able to make. Material must be at hand at such times as will be ready for use and not necessitate storage or extra handling; it must also be delivered in such a manner as not to cause a delay in installation. This is easily controlled by the progress schedule whether the building be in the same city as the shop or whether they be miles apart.

The sub-contractor in proceeding to arrange and maintain a progress schedule would enter first the dates of the receipt of the order, the date called for for completion of the order, and then the various subdivisions of his work.

The illustration (Figure 1) given herewith shows a progress schedule as adapted particularly to a factory producing ornamental iron, but with slight variations could be adaptable to any sub-contractor's work. This illustration will show how the sub-contractor can preserve a complete record of his materials and men, the production of his factory or shop, and the record of deliveries at the building.

The operation of such a schedule is so simple, requires so little time and no extra employees, and is of such great value if properly maintained, that it should be an integral part of every office equipment. The reasons for its use are so obvious that the only excuse for not adopting such a record seems to be unfamiliarity with the principles and advantages. After a very short experience the progress schedule becomes almost automatic.

The sub-contractor by the use of such a progress schedule as shown in Figure 1 is enabled to control not only his own organization and products, but those who execute parts of his contract outside of his own premises. The modeler, the carver, the foundry man, all become a working part of his organization and under his control even though the actual work is done at a considerable distance. He is able to check their progress and assure himself that the work is being carried on in a manner so as not to interfere with his contract liabilities nor cause any delay.

As with the general contractor, so it is with the sub-contractor, that one of the principal causes of disturbance and argument is the question of delay which continually arises. If at the completion of the building the general contractor is called upon to face a delay claimed by the owners, he must naturally search for the source of this difficulty. The first assumption a general contractor would be inclined to consider is that the delay is directly chargeable to his sub-contractors rather than to his own organization. The sub-contractor, therefore, who maintains the progress schedule can demonstrate beyond a reasonable doubt whether or not the delay is justly chargeable to him. Unfortunately for the sub-contractor it is too frequently a fact that the general contractor arbitrarily reduces the amount of his final payment by charging for delays, whether actual or imaginary, and the sub-contractor, rather than have the courts decide the merits of the case, accepts the deduction. It might be difficult to produce sufficient evidence to convince a court that the sub-contractor had no part in the responsibility for the delay. Time books and statements of mechanics or foremen are not in themselves sufficient evidence. No court in the country, however, would minimize the competency of the evidence of a progress schedule. This is particularly true of a schedule which has been reported monthly to the contractor.

There is still another phase of the sub-contractor's business in which a progress schedule can be of tremendous value to him, and that is in correctly checking and estimating his monthly requisitions. It is becoming more and more a common practice among architects to arrange for monthly payments to the general contractor, and these payments carry a certain sum for the sub-contractor, which sum the sub-contractor sometimes receives and sometimes unfortunately does not get at all, the general contractor holding it back for one reason or another.

The sub-contractor who properly operates the progress schedule finds that his work in making up his monthly estimate of work done is very much simplified. Those who do not use this process are required to approximate the amount of work already completed and delivered at the building by rule of thumb or by inaccurate or incom-

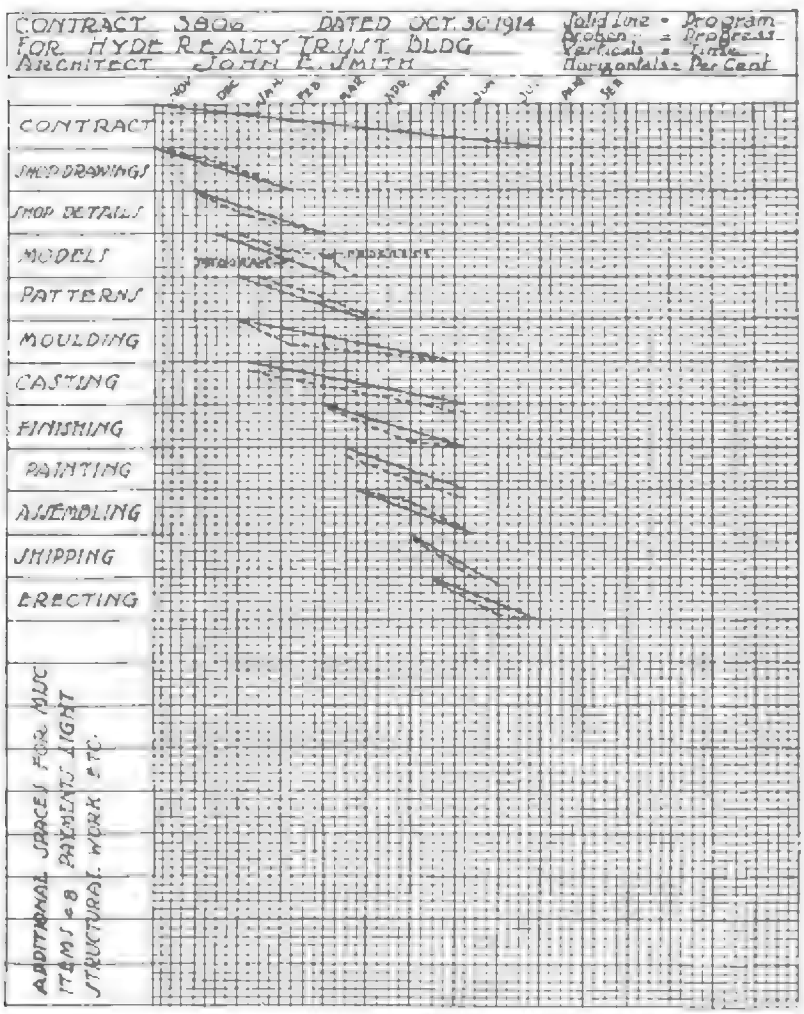


Figure 1. Type of Progress Schedule Adapted to Charting the Progress of the Manufacture of a Building Product

plete factory records. The progress schedule, however, shows at a glance just what proportion of work has been completed, and the general contractor upon receiving the requisition of the sub-contractor accompanied by a copy of his progress schedule can verify for himself the amounts due.

These monthly returns of progress schedules from the sub-contractor to the general contractor and from the general contractor to the architect and owner form an excellent basis for checking and terminating any incipient tendency to delay: for example, if the sub-contractor in forwarding his progress schedule to the general contractor shows by the progress lines that his work is up to the mark, there is no possible chance for the general contractor to claim delay on any point except installation at the building; if, on the other hand, the progress line shows a tendency to lag behind the point at which it should be, the general contractor can easily remedy this difficulty by calling to the sub-contractor's attention his liability in case of delay.

Another reference to the illustration (Figure 1) will clearly define the possibility of noting where delays occur in the progress of parts of the work. This gives an opportunity to determine at that particular time the exact cause of delay and also gives a very clear idea of how much greater speed must be developed in turning out the particular portion of the work previously delayed in order to make up the time lost.

As a concrete illustration of the working of this schedule, take, for example, the item "Models." The program line shows that the making of models should start on or about December 15 and should be completed on or about March 6. Instead of maintaining these dates, however, the models were not commenced until about January 1 and were completed about March 21.

The delay in delivering the completed models was necessarily the cause of a delay in finishing the patterns, but this delay was overcome by extra pressure in other departments so that the whole contract was completed at the time agreed upon in the contract. Reference to the "Models" progress line shows that the early part of the modeling was carried on at the rate of speed required to fulfil the conditions of the program, but that when about 40 per cent completed, the work slowed up appreciably and at about 55 per cent resumed a greater rate of speed than at first, which brought the date of completion nearer the program date than would have been the case were the contract rate of speed maintained from this point.

Upon investigation it appears that at the time when little was being done on the actual models in the shop, some models had been presented to the architects for examination and approval, and that the time thus consumed was greater than had been originally considered necessary in the establishing of the program.

The reason for the delay in starting the models was due to the fact that the information, after the completion of the shop details, had not been properly and quickly communicated to the modeler, which delay was directly chargeable to the sub-contractor.

In case the completion of the whole contract had been delayed, the responsibility for this, therefore, would have been automatically placed by this progress schedule on the organization of this sub-contractor. The delay in "Models" was not due to the lack of attention of the architect to the approval of models, but was due to the fact that the modeler selected was not able to fully interpret the architect's drawings without several trials.

One of the defects of this form of progress schedule is also apparent, as will be noted under the head of "Casting." The casting was commenced at the time specified

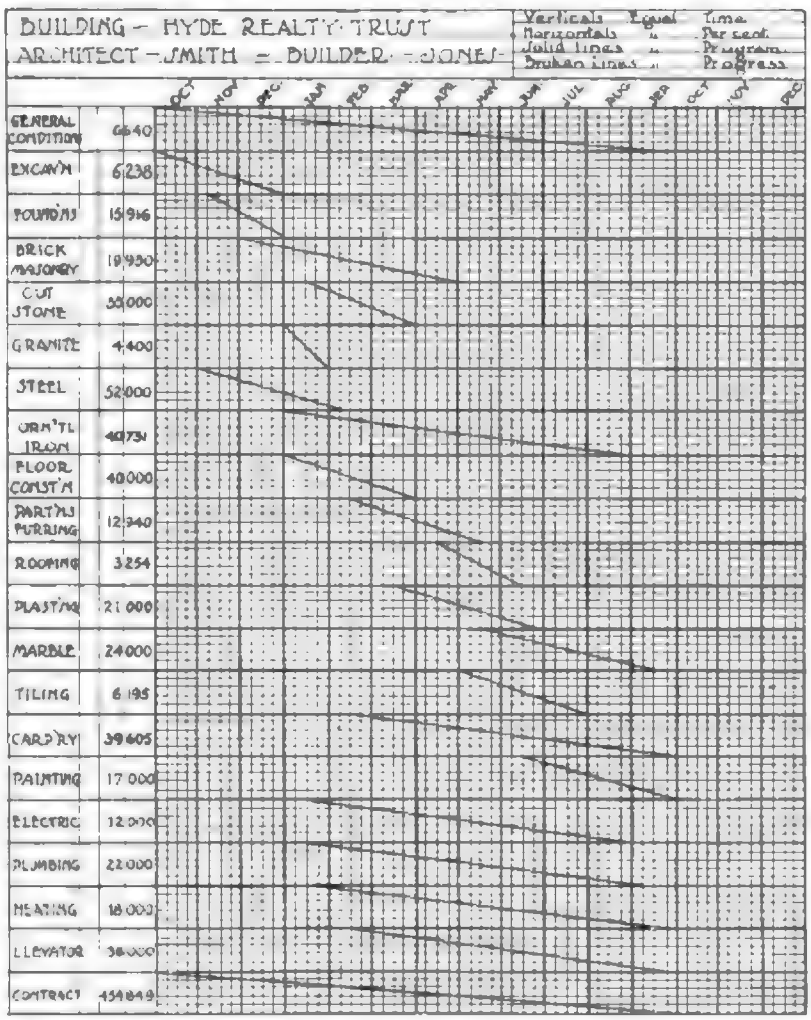


Figure 2. Type of Progress Schedule Particularly Adapted to Provide a Record of Operations for the Owner

in the program and was also completed at the time specified which would make the progress line and the program line coincident. In order, however, to illustrate the progress of the work, it was necessary to establish another line, which during the course of the casting process became a line parallel with that in the program. The completion of the "Casting" progress line, therefore, overlaps the item below.

A later form of schedule will indicate one of the methods used to overcome this defect.

In the form presented in Figure 1 there are other features which are equally subject to criticism and upon employment of a progress schedule this would be readily apparent. The fact remains, however, that there are a sufficient number of good points about this or any other form of progress schedule to counterbalance the effect of those points which might be considered of little value. The principal feature which the progress schedule, broadly speaking, maintains for the general contractor and the sub-contractor is in the actual checking of progress of their work, in the correlation of the different organizations into a single unit, and in the method by which potential disagreements may be disposed of in their incipiency in such a manner as to preserve harmony in all the different trades.

At a glance it would seem as though a diagrammatic progress schedule would be of little value to the owner of the prospective building except as a matter of curiosity and general interest, but this is far from the case. The owner is able by means of a progress schedule not only to prepare for his monthly payments on the certificates of the architect, but is also able to approximate payments for some time in advance.

The advantage of this is obvious in that many times the entire financing of the proposition is not completed at the time the contract is signed, and it is not definitely determined just how the loans shall be made in order to meet the payments at regularly stated intervals. An owner, however, by consulting his progress schedule may readily approximate months in advance, with a very close degree of accuracy, payments which may then be due, and is able to have sufficient time at his disposal to properly arrange these loans to his best advantage.

Without a progress schedule frequently a requisition comes in and certificates are issued by the architect for a greater amount than the owner anticipates, which may occasion a slight delay in arranging his payments for his contractors. This is a potential source of embarrassment, as contractors, as a rule, arrange all of their payments on the supposition that the money will be forthcoming as soon as the certificates of the architect are issued, and in many instances the contract is so worded that the payment must be made within ten days after the filing of the requisition. It is, therefore, obvious that anything which will give the owner a fair idea of how the payments will be requested a sufficient length of time in advance so that he may be able to provide for his loan, is distinctly a matter of interest to every owner and real estate operator.

Another way in which the progress schedule can be of tremendous value to the owner and real estate man is in approximating the time of completion and in checking over the progress in such a manner that he can determine whether or not there is any likelihood of dates of occupancy being subject to change. Where no progress schedule is employed it is necessary to rely entirely upon the hypothesis of the contractor as to whether or not there will be any delay until very close to the date of completion, at which time it is frequently embarrassing to the owner if he finds it necessary to substitute a new date in leases already arranged with tenants.

This diagrammatic progress schedule eliminates in a large degree the possibility of such an occurrence in that the progress of the contractor can be watched carefully through the months of construction, and whenever leases are made the relative status of the work, as compared with the status assumed under the contract, can readily be noted. This feature in itself should be sufficient to warrant the existence of some such record for the use of the owners of buildings. The feature of enabling him to approximate his probable payments to the general contractor is also of sufficient importance, but there are other features which the use of a progress schedule develops, which are in themselves of equal or greater importance than those enumerated.

Figure 2 illustrates a form of progress schedule which is particularly of value to the owners, real estate operators, and trustees of estates, in that it contains all these types of information, which is of extreme value to them during the process of construction of the building and which is of value to them as a record after completion.

An analysis of Figure 2 will show how exactly the owners or trustees can approximate in advance the probable payment which will be required on the first of any month. It will also show how a progress schedule will give the information in regard to the changes of dates of tenancy. Another factor of value of a progress record to the owners is in its comparative value in regard to other buildings already completed and other projects under way. Very frequently the owners in preparing for the erection of a new building find a record of a previous structure of inestimable value. The record, however, such as occurs in Figure 2, which on the completion of the building shows the duration of the various sub-contracts, is of far greater value than any other form yet produced, in that the owners may readily refer to the time consumed by any particular branch of the building operation rather than to be confined to the duration of the building operation as a whole, and by means of a schedule of this character a real estate operator or a trustee or an owner could closely approximate the time required for the construction of a building, even though it be a little different in character or larger or smaller than the one of which he has the progress schedule at hand.

Figure 2 will show the program lines only, the progress schedule not having been completed as this is purely a hypothetical case. It does show, however, how easily extensions can be made in various subdivisions of the contract or in various additional items of interest to the owner but not to the general contractor, such as vacuum cleaner, sprinkler system, insurance rates, land costs, assessments, etc., all of which can be added to this schedule with perfect facility making a complete record of the transaction.

The High School.

II. DOMESTIC SCIENCE, COMMERCIAL, AND MANUAL ARTS DEPARTMENTS, AND SPECIAL ROOMS.

By WALTER H. KILHAM.

Laundry, High School of Commerce, Springfield, Mass.
Kirkham & Parlett, Architects

THE domestic science department comprises accommodations for instruction in cooking, sewing, and housekeeping, and requires the space of at least four or five classroom units.

Cooking Room. The pupils' tables are placed in the form of a hollow rectangle or oval, with the teacher's demonstration table in the center, in much the same arrangement as described in a previous article (THE BRICKBUILDER, June, 1915) for the elementary school. A small gas stove on top of the table, with an aluminum plate under it, is often provided; but more recently each pupil is given a four-cover gas range complete with oven and all appliances, standing on the floor at the side of each table. Acting upon the theory of reproducing as far as possible conditions actually met with in most peoples' homes, a regular coal range is also installed, together with a kitchen sink and a "dresser" for dishes. A refrigerator and if possible a pantry should be added, and unless a "model flat" is included, there should be space for setting a dinner table.

Cooking Room, High School of Commerce, Springfield, Mass.
Kirkham & Parlett, Architects

Model Flat. The extent to which the development of the "model flat" is carried generally rests with the authorities. Some are contented with a small dining room, sometimes tastefully equipped with a fireplace, china cupboards, and "dome" electric light. With these surroundings the pupils practise the giving of dinner parties, act as hostesses, and are responsible for the entertainment of their guests. Other authorities add a bedroom, and some cities, New York for example, install a complete suite, adding living room, hall, kitchen, laundry and bathroom to the above. These may be arranged as a series of alcoves, about 8 feet square with one side opening to a continuous space about 8 feet wide where instruction may be given. At the other side of this space is a row of large store closets containing changes of furniture, pictures, rugs, and wall papers mounted on cloth, the pupil being given an alcove and expected to select harmonious decorations and furnishings for it.

Laundry. A complete laundry outfit is rarely installed, some earthenware trays with ironing table and electric irons being considered adequate.

Sewing Room. The sewing room requires blackboards, workcases with racks, and cases of special design for materials and work. For dressmaking, a separate room is necessary with dressing booths, either built in or made by curtains. A sink or basin with running water is needed, and outlets for electric irons for pressing, etc. The following list gives the equipment as installed in schools built in Boston, Mass.:

30 Portable tables (inserted yard measure).*
50 Chairs in girls' school*
and
30 In mixed schools, varying in height from 14 to 21 inches from floor.*
1 Glass show case about 8 feet long, 2½ or 3 feet wide.
1 Cutting table, 8 feet long, 3 feet wide, and 2 feet 6 inches high, inserted yard measure, 3 drawers in table, blackboards, minimum of 30 square feet.
Closet for teachers' wraps.
Stationary wash bowl with running hot and cold water.
1 7½-lb. electric iron.
1 4-lb. electric iron.
Standard box rack with box for each girl. (See drawing.)
1 Sewing machine for 500 or fewer girls.

The Commercial Department. The rooms of this department require little in the way of special equipment unless a bank is included. This should face either on a corridor or be near it, so that a school savings bank system may be handled through it if necessary. Its construction is shown by the illustration. Some rooms are generally equipped with special desks for instruction in bookkeeping, stenography, and typewriting, the number of these rooms depending upon the purpose of the school. An

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* Not required when no regular "sewing room" is available.

office equal in size to about a third of a class room is a useful feature when it can be provided.

The Manual Arts Department. The development of this branch of high school instruction has afforded perhaps the most striking feature of modern high school planning. It forms the most popular feature of high school work, being barely equaled by the commercial department, and it provides a striking indication of desire of American boys for technical and practical in preference to general or classical education. The writer of these articles does not intend to venture into a field which is properly purely one of pedagogy; but his observations in this respect have led him to the belief that in spite of the large sums of money appropriated by many cities for this purpose, there has been a failure of efficiency in reaching the ultimate object desired. The public school is of necessity a school for the masses, and it is the boys coming from the homes of the masses who need training in manual work of a practical sort. Too much "kid-glove" atmosphere is ruinous to this sort of training. Some large cities have recognized this and are showing a tendency to erect separate buildings for Manual Arts or "Vocational" High Schools, but even when this is done, the writer believes that the coeducational feature should be avoided and the boys' departments kept rigidly separate.


Bank in High School of Commerce, Boston, Mass.
C. Howard Walker and Kilham & Hopkins, Associated Architects


First Floor Plan, Carter H. Harrison Technical High School

In smaller cities this cannot be accomplished because of the expense, and obviously the carpentry, machine tool, and forge work have to be carried on in the same building with the regular courses. When this occurs it is highly desirable to separate these portions of the building as much as possible from the rest, so as to prevent the noise resulting from their operation reaching the rest of the building.

This has been admirably accomplished in the Carter Harrison Technical High School at Chicago, of which Mr. A. F. Hussander is the architect, and the plans reproduced here are worthy of careful study. The woodworking, machine tool, foundry, forge room, and electrical construction departments are arranged at the rear of the building in a manner to interfere as little as possible with the other exercises of the school. Adjoining this section is a two-story wing, running off at right angles to the side of the building and containing besides the power plant space for instruction in carpentry, masonry, plastering, sheet metal work, house and sign painting, plumbing, and gas fitting, and even tanning and soap manufacturing.

The spaces for these various departments are arranged along a 12-foot corridor and are separated from each other by masonry walls. While much thought has been given to the arrangement of this department, it is worth while to consider whether much of this work could not be efficiently handled in a long, factorylike building free from permanent partitions. Such an arrangement would approximate more closely actual shop conditions and allow much greater flexibil-


Carter H. Harrison Technical High School, Chicago, Ill.
A. F Hussander, Architect

Lunch Room, High School of Commerce, Springfield, Mass.
Kirkham & Parlett, Architects

ity of instruction. Manual and vocational instruction is still passing through a period of development and is liable to many changes, even from year to year, causing variations in the amount of floor space demanded, and it would seem to be a mistake to define by permanent walls the portion allotted to each branch, when the work could probably be as well carried on by groups working in different parts of one long room.

Adequate wash rooms are an essential part of this department, for in order to save time it is necessary to allow an entire section to wash at once and similarly ample lighting is highly essential. By arranging these rooms in wings at the rear of the building many of them can be skylighted and at the same time easily ventilated.

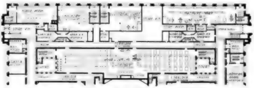
Raised steps for demonstration seats are often, but not always, provided in one corner of the workrooms.

Another arrangement of similar nature to that of the Chicago school is in the Central High School at Minneapolis, Mr. William B. Ittner, architect, where the section allotted to metal working is placed at the rear in a low wing on one side of the center, and a corresponding wing containing the woodworking department at the other side, each being skylighted. Each of these wings also contains the additional feature of a small lecture room with raised seats and blackboards. It is needless to say that the construction and finish of this portion of the building ought to be of the plainest and most durable description. The walls should be of painted brick and free from plaster or other easily damaged material. Salt glazed brick may be employed if desired for the lower portions. The floors in the woodworking rooms are best made of waxed maple, while cement is suitable for the machine tool room. A floor of wood paving blocks is admirable for the forge room and foundry and if made of round blocks it will not give trouble by swelling and shrinking. Such a floor obviates the danger from flying fragments of concrete and a slight amount of dampness occurs which is desirable for the moulding sand.

Lunch Room. Another very modern development of a high school is the lunch room. Until very recently this has been located in the least attractive portion of the building and usually restricted to the space in the basement directly behind the front steps, which, being badly lighted, has not been available for any other use. The accommodations were generally limited to a counter with perhaps a small storeroom and gas stove, and slight provision was made for the comfort of pupils while eating. Tables and chairs were unknown and the eating was done in the corridor.

Recent years have shown a material change in this condition of affairs, and the lunch room has not only become an organic part of the establishment, with carefully thoughtout provision of adequate space for the pupils, but also care is now taken to make the lunch room an attractive part of the building. The temptation still remains to locate it in the basement, the space under the auditorium being naturally the most available now that the basement gymnasium is becoming

Plan of Lunch Room in Basement, Carter H. Harrison Technical High School

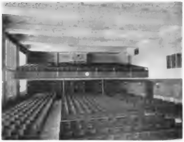


Plan of Manual Arts Department, Carter H. Harrison Technical High School

Interior of Woodworking Shop

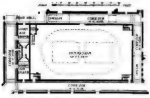
Carter H. Harrison Technical High School, Chicago, Ill.
A. F. Hussander, Architect

a thing of the past. This generally gives sufficient area, but is apt to be dark and of insufficient height. It is explained in defense of this plan that the pupils at the best spend only a short time at lunch, the tendency of the rising generation being against "Fletcherizing," and that after lunch they wish to go out of doors; hence, a location near the ground is desirable and sunlight is not essential. The recently built Chicago high schools, however, contain lunch rooms in the upper stories, that in the Carter H. Harrison being located in the second story and that in the Nicholas Senn, on the roof. The Washington Irving High School in New York contains three lunch rooms, all located above the ground floor. The lunch room at the Carter Harrison School is 58 by 248 feet in size, 14 feet high, and is lighted by ranges of windows on each side. There is a kitchen with serving counter at each end with a rail to keep the pupils in line. On entering the room through a door leading to the space inside the rail, each pupil obtains a check, then successively takes from the counter a tray, a plate, knife and fork, paper napkin, and such articles of food as he desires. On leaving the "queue" his slip is punched to the proper amount by an attendant and he goes to a table. Drinking water is obtained from fountains located at the side of the room through faucets, which can be turned on by pressing the tumbler against a bar, obviating the necessity of touching them with the hands and allowing a pupil to obtain two glasses of water at one time. Cashiers stationed at each of the two exits from the room receive the money and checks from the pupils as they pass out. The serving equipment requires a counter with shelving, kitchen with gas apparatus, dish washing appliances, storeroom, refrigerator, etc.



Assembly Hall, High School of Commerce, Boston, Mass.
C. Howard Walker and Kilham & Hopkins, Associated Architects

The accompanying illustration shows the lunch room at the High School of Commerce at Springfield, Mass., Messrs. Kirkham & Parlett, architects. This is located in the basement under the assembly hall. The walls are lined with glazed brick for their full height and the pupils are seated at small round tables, each supplied with four chairs.



First Floor Plan of Boys' Gymnasium
Carter H. Harrison Technical High School
Chicago, Ill.
A. F. Hussander, Architect

Music Room. Many cities require a room where singing and chamber music can be taught. A room about the size of one and one-half or two class rooms will be sufficient and it may have a small stage. White paint and Ionic pilasters are usual but not obligatory. Other schools omit the music room and substitute a room equipped as a large class room or study hall, sometimes handsomely paneled, where elocution and oratory may be practised. No definite rules can be laid down for the design of these rooms that will apply in all cases.

Mechanical and Free Hand Drawing. The rooms for drawing classes are best located on the north side of the building so as to profit by the steady light. There is some

View Looking Toward Stage

View Looking Toward Rear Balcony

Assembly Hall, High School of Commerce, Springfield, Mass.
Kirkham & Parlett, Architects

advantage in keeping the mechanical drawing class near the manual training department, but the free hand drawing room may well be located in the top story where skylights can be had. The best form for the latter is the "saw-tooth," with windows toward the north or high windows in the wall, similar to those in a studio. These rooms require a large sink with faucets high enough to permit of washing drawings, facilities for blue printing, and racks and cases for drawing boards, etc. Blackboards are desirable as well as tack boards for hanging drawings.

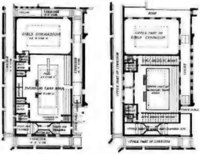
Botanical Laboratory. This department may be about the size of an ordinary class room. A sink is necessary and also cases and drawers for specimens. An ideal arrangement is to locate this room on the ground floor on the south side and have adjoining it a greenhouse, and if the land permits a small garden.

Assembly Hall. This subject has already been touched upon in a previous article dealing with the elementary school (THE BRICKBVILDER, June, 1915) and but little remains to be added. For a high school it will usually be necessary to introduce a motion picture booth with vent, and frequently to provide space for an organ, while on the whole a more elaborate architectural scheme is generally expected.

Gymnasium. Gymnasiums have now become pretty well standardized and a school gymnasium will not vary greatly from one designed for a Y. M. C. A. Side galleries for spectators are desirable, together with rooms for the physical director, extra apparatus, and for the visiting team, drying room, sterilizer, etc. In fact, this part of the building deserves more consideration than can be given to it in this paper. Where the school is coeducational and of sufficient size, two gymnasiums are desirable or a single large gymnasium may be built, divided into halves by a removable partition. Very large schools may have two or more gymnasiums.

The swimming tank has now become an important feature and most large schools make some provision for one. At the Carter H. Harrison School in Chicago the tank is 24 by 60 feet, graded from 5 to 7 feet deep. The boys' and girls' dressing rooms are arranged in the gallery, which also contains seats for spectators. On the main floor are rooms for bathing suits, storerooms, and showers. The floor around the tank is of cork carpet and the combination draining groove hand rail is used.

View of Swimming Tank Room



First and Mezzanine Floor Plans of Swimming Tank Room

Carter H. Harrison Technical High School, Chicago, Ill.
A. F. Hussander, Architect

Gymnasium, High School of Commerce, Boston, Mass.
C. Howard Walker and Kilham & Hopkins, Associated Architects

Gymnasium, Carter H. Harrison Technical High School, Chicago, Ill.
A. F. Hussander, Architect

The New York Orthopaedic Dispensary and Hospital.

YORK & SAWYER, Architects.

By LINDLEY M. FRANKLYN.

THE work of this charitable institution consists in the treatment of crippled children and adults administered in the dispensary, in the hospital, in the home by the visiting nurses, or at the country branch for convalescents at White Plains, N. Y.

The special conditions which the architects had to study in designing a building to house this institution, and which proved to be the controlling factors in determining the plan, may be stated briefly as follows:


Open-Air Loggias in Northeast Court

1. The site is in the middle of the block. It has a frontage of about 88 feet on 59th street and 127 feet on 58th street, the level of 58th street being four steps higher than 59th street.
2. A single entrance was required for all employees, patients, and visitors.
3. Numerous small rooms were necessary, and to light these a building with a long perimeter.
4. A very large dispensary, well lighted, with good natural ventilation, had to be arranged conveniently for the surgeon to attend to his four classes of patients: new, continued, male, or female.
5. Ten-bed ward units were determined upon; at least three units to be placed upon a floor.

With these fixed conditions the problem was to plan a hospital which should have not only light wards and a well arranged dispensary, but an enormous basement, covering 80 per cent of the lot, in which practically every room should have good, natural light and ventilation. After thorough study and the preparation of numerous schemes, the cruciform plan was selected, as it proved by comparison to be the best solution of the problem fulfilling all the requirements.

By referring to the floor plans it will be seen that the first, second, and third floors cover less area than the floor below, and that there are no enclosed courts above the basement. Planned in this way, it is possible to provide additional overhead lighting for the more important rooms in the lower stories; and even in the basement the kitchen, laundry, servants' dining rooms, and most of the bedrooms have direct sunlight for a good part of the day.

The building is of the most modern type of fireproof construction. The exterior walls are self-supporting, the structural steel carrying only the floor loads. The floor construction is of reinforced cinder concrete and the partitions of hollow terra cotta tiles. The horizontal pipe lines are run below the floor construction and the ceilings hung below these lines. Access doors, flush with the plaster, are provided wherever there are valves or clean outs.

The two main staircases, located in the north and south parts of the building, are entirely enclosed and separated from the corridors by fireproof doors. The elevators, directly across the corridor from the staircases, are equipped with self-closing doors and a check to prevent the doors striking when they close, thus avoiding noise. A fire-escape stairway leads down from the main roof into the northeast court.

The exterior of the building is designed in the Renaissance style of northern Italy. The wall surfaces are of stucco and the cornices, trim, copings, and sills of a special red terra cotta. The sloping roofs are covered with tile of the same color as the terra cotta. The windows on the ward floors have transoms hinged at the bottom to swing in.

The interior finish throughout is as simple and inexpensive as is consistent with good hospital construction. There are painted cement floors in the sub-basement and basement, and in the bedrooms for the staff, nurses, and servants. The kitchen department, however, the laundry, most of the rooms in connection with the dispensary, the operating suite, dressing rooms, pantries, and the toilets and baths have tiled floors. A special colored battleship linoleum is used in the offices, gymnasium, wards, quiet rooms, and in the ward corridors, with a terrazzo sanitary base and a floor border flush with the linoleum. At the junction of the linoleum and terrazzo (which are flush) there is a built-in brass strip which not only serves as a guide for running the terrazzo, but also protects its edge until the linoleum is laid.

Tile wainscots set flush with the plaster are used in the kitchen, pantries, operating rooms, dressing rooms, plaster rooms, and in the toilet and bathrooms. The interior doors throughout have steel framed trim, flush with the plaster, thus avoiding the use of wood. In the corridors, wards, and certain other rooms there is a painted dado about four feet high, so that the lower portion of the walls when defaced or finger marked may be repainted without touching the upper portion.

The plant for supplying heat, power, light, ventilation, and refrigeration, and the suction and hot water tanks, filters, and pumps, are in the sub-basement at the south

Operating Room Showing Visitors' Gallery

end of the lot. The heating is by direct radiation. The ventilation, reduced to a minimum, is divided into five separate units, namely, a fresh air supply and exhaust system for the sub-basement; an exhaust for the brace shop department, X-ray rooms, gymnasium, and waiting room; an exhaust for the laundry, kitchen, and pantries; an exhaust for the toilets, baths, and maids' closets; a fresh air supply and exhaust system for the operating suite. This division of the ventilation into small units is economical, as the independent fans are only operated when the rooms which they ventilate are in use. In general, natural ventilation is relied upon rather than artificial.

All supplies, except those for the brace shop, are delivered at the service entrance on 59th street and dropped to the receiving room in the basement on an electric lift. When unpacked and checked, they are taken to the adjoining store rooms.

Directly across the corridor from the receiving room is the entrance to the kitchen department. Here are storerooms for groceries, canned goods, etc., a cooled vegetable room, three large refrigerators, and an ice-cream room with a stock ice-box, power ice crusher, and power freezer. The kitchen, lighted on the south and overhead, is completely equipped with modern cooking apparatus. Two automatic power dumbwaiters, serving the pantries, open directly from the kitchen. The servants' dining rooms are on the opposite side of the main corridor.

The laundry, lighted on two opposite sides, is equipped with individual motor-driven apparatus. Directly across the corridor are rooms for soiled linen, general linen storage, and assorting and marking.

The brace shop with its auxiliary rooms for polishing and grinding, forge work, sewing and leather work, storerooms and office, is on the 58th street side of the lot. There is a separate entrance from the street for supplies for this department. The shop has windows on three sides, the polishing and grinding room has overhead light and windows on opposite sides, opening on areas, while the leather and sewing rooms have north light. All machines are individual motor driven.

In the basement also there are bedrooms for the male help, a room where plaster jackets are made, a sterilizer large enough to take mattresses, a carpenter shop, storerooms, and toilet and locker rooms for the female day help and other employees. The engineer's and foreman's toilet is also on this floor instead of in the sub-basement on account of the high level of the sewer.

The entrance on 59th street is the only one on this floor (the door on 58th street serving only as a fire exit). Opening directly from the entrance lobby are the office, reception room, consultation room, and telephone booth with the various offices, locker and toilet rooms, and the board room in close proximity. Doctors, nurses, and visitors going to the wards or operating suite take the first elevator without passing through the dispensary.

The waiting room opposite the entrance is planned so that every one entering or leaving the dispensary passes in front of the registrar's desk. Opening from this room are two toilets, and behind the registrar are the history library, and the head visiting nurse's office. Adjacent is a room where plaster casts are taken and prepared for the brace shop, another where the patient's history is recorded, and two toilets.

The main dispensary room, separated by a short corridor from the waiting room, is two stories in height and lighted by ten large, circular headed windows. It is designed with a vaulted ceiling. The floor is of buff quarry tile with a black terrazzo base and border, and the walls show a high, painted wainscot. The clerk's desk is in the center of the room with a stairway to the basement directly behind it. The screens, of reinforced cement plaster supported on brass legs, divide

Typical Pantry Connected by Dumbwaiter with Kitchen

View of Kitchen in Basement

the room into the several departments for examination and treatment.

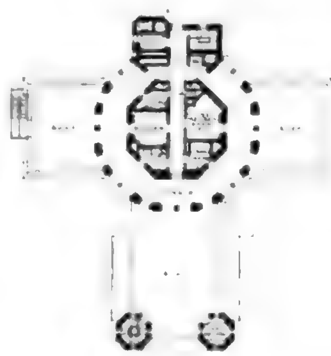
The dispensary operating room, the scoliosis department with a large gymnasium, dressing rooms, office, and plaster room, and the X-ray department are in the south wing. The X-ray is planned with the coil room between two operating rooms, each furnished with small dressing rooms. Across the corridor are the dark room, library for developed plates, and the view room. The operating rooms, dark room, and view room have light-tight sliding shutters at the windows with a light-tight ventilator below the sill.

The living quarters for the superintendent and internes are on the second floor in the 59th street wing. The contagious wards are between this wing and the upper part of the dispensary and are isolated from the rest of the building. This is a complete unit with two wards opening on flat roofs, toilet, diet pantry, and a nurses' room with bath. This department is entered through a vestibule where the doctor may wash and change his gown. The maids' quarters are in the 58th street wing on this floor.

The entire third floor is devoted to living quarters for the supervisor of nurses, housekeeper, and the nurses. The five bedrooms in the west wing are shut off by a corridor door and occupied by the night nurses. On this floor there is also a dining room with its pantry, a sitting room with casement sash opening on a balcony, a reception room, a sewing room, and a kitchenette.

The fourth, fifth, and sixth floors are each occupied by three ten-bed wards controlled by the charge nurse, who has her desk in the central hall. The fourth floor has wards for men and boys, the fifth for women and girls, and the sixth for children alone. Each unit is separated from the main corridor by double doors and consists of a ward lighted on three sides, a dressing room, and a toilet and bath room. The loggias open directly from the central wards and from the main corridor. On each of these floors there are also two quiet rooms, a diet pantry served directly from the kitchen by two power dumbwaiters, an alcove off the main corridor with a lavatory for the doctors, a nurses' toilet, and closets for ward accessories, patients' clothes, linen, etc. On the fourth floor there is an office for the supervisor of nurses and an admitting room where patients are examined and bathed before being placed in the wards.

The operating suite at the north end of the first ward floor is planned with the main operating room in the center, with the anesthesia, plaster, preparation, and sterilizing rooms opening from it. The small septic operating room adjoins the preparation room and is conveniently near the room for anesthesia. The work room for the preparation of bandages, pads, etc., is to the west of the sterilizing room. There is also a doctors' locker room with toilet and bath and an office for the chief surgeon. The recovery room is just outside the suite.



Plan of Roof

Plan of Sub-Basement

The main operating room is arranged with an amphitheater seating forty-six. This is reached by the students and visiting doctors by an inclined passage from the floor above, thus obviating the inconvenience of having visitors in the operating suite. The seats in the gallery are supported on brackets and made of cast-iron, modeled in the form of a bicycle saddle. This type is not only sanitary, but take so little space from the passageways as to enable the observers to be placed much closer to the operation than is usual. The room is lighted by a north window and skylight constructed of steel and glass and provided with condensation gutters. Inside the window is a glass screen in a steel frame. As hot air is introduced between the sash and this screen, there is no down draft even in the coldest weather. The floor and wainscot in both operating rooms are of dark green tile, while the upper walls are of plaster painted a light color. With this dark wainscot and floor, the surgeon, looking up from the patient, does not encounter a glare of light and find his eyes useless for a moment when he returns to his work, as is the case with white floor and walls. The ventilating apparatus for this department is in the attic space directly above the operating suite.

The drug room and laboratory are on the fifth floor. The latter is equipped for doing all the necessary pathological, bacteriological, biological, and chemical work of the hospital. On the sixth floor is an autopsy room and an isolation room with its bath and toilet room.

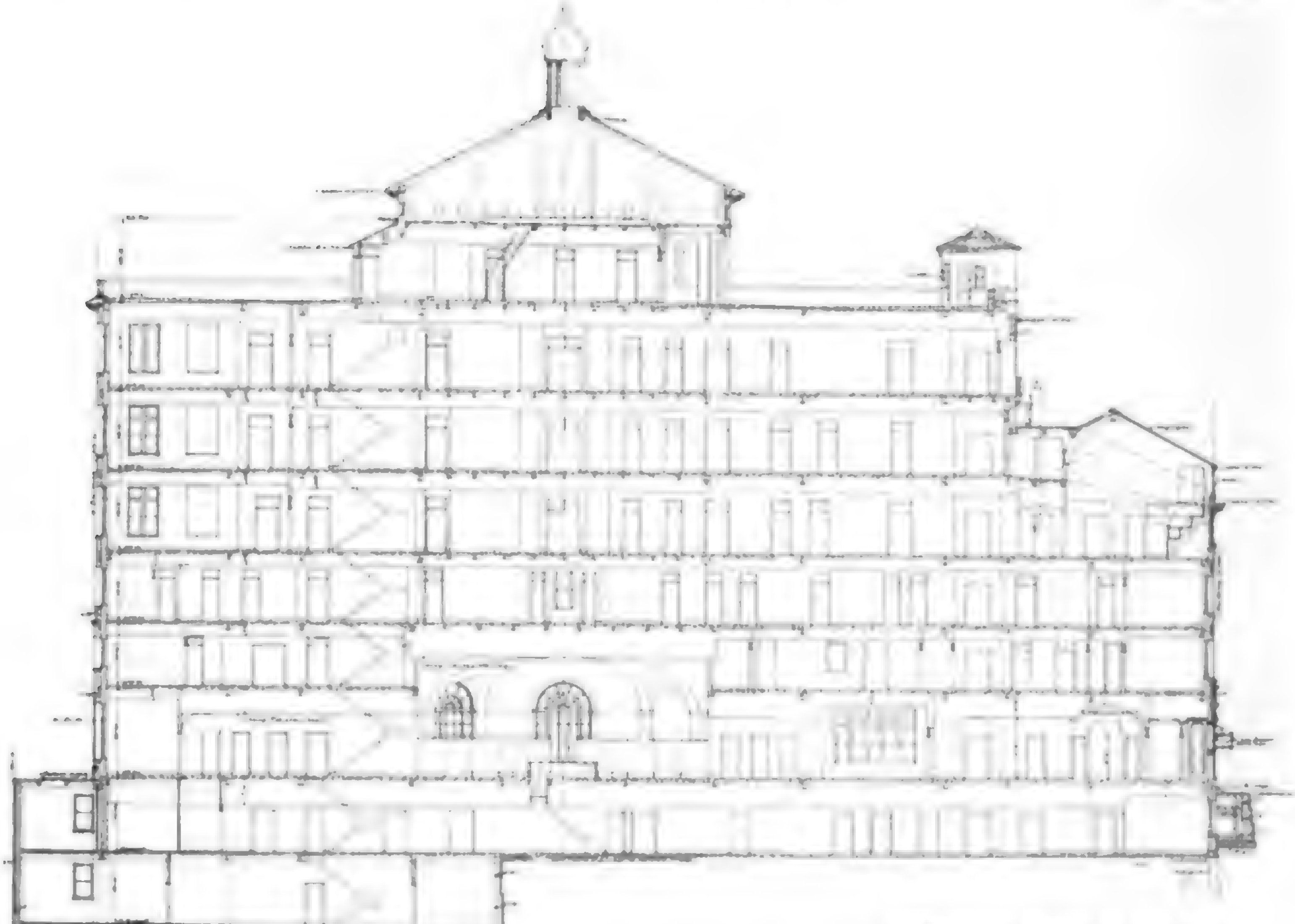
Only the central portion of the building is carried up above the seventh floor, thereby leaving a large area of flat roof for outdoor treatment and recreation. The loggia in the center gives ample protection in stormy weather. On this floor is a rest room for nurses, two toilets, a mattress room, and a tank room in connection with the refrigerating apparatus. A stairway leads to the attic space above, where are located the house tank, two of the exhaust ventilating fans which discharge the foul air through the cupola, and considerable storage space.

There are nine wards planned for ten beds each, or a total of ninety ward beds. Six quiet rooms, a two-bed isolation room, and six beds in the isolation department make a total of one hundred and four patients' beds. There are twenty-eight single rooms for nurses, three suites for the superintendent, supervisor of nurses and housekeeper, four rooms for internes, accommodation for twenty maids and five male help, giving a total bed capacity of one hundred and sixty-four.

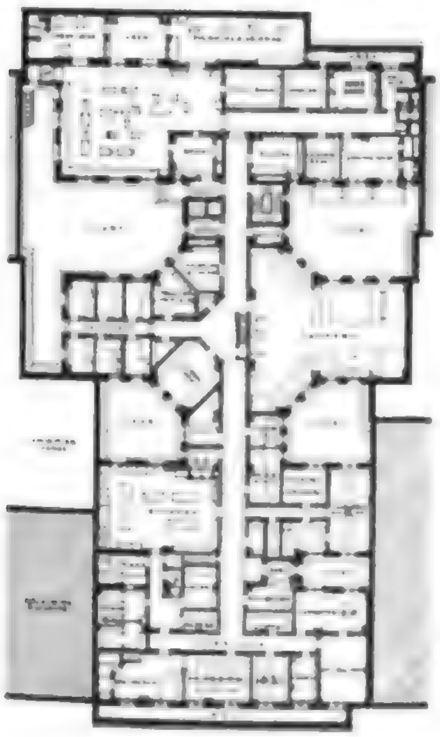
EAST 59TH STREET FACADE.

NEW YORK ORTHOPAEDIC DISPENSARY AND HOSPITAL, NEW YORK, N. Y.

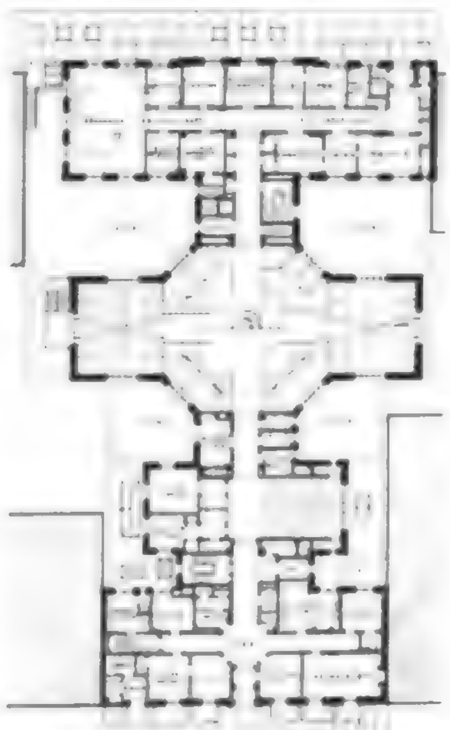
YORK & SAWYER, ARCHITECTS



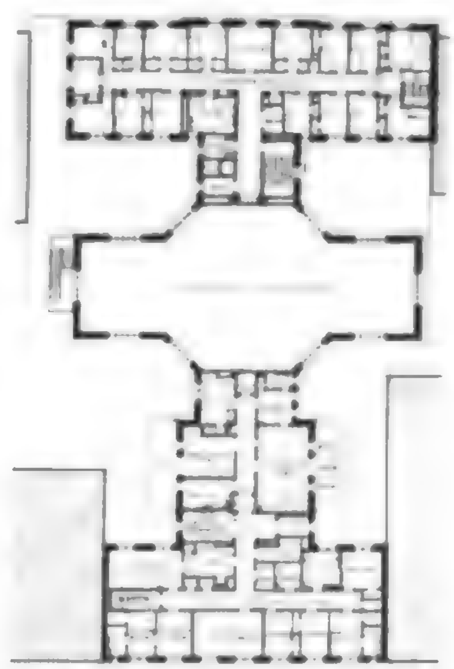
LONGITUDINAL SECTION ON MAIN AXIS



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

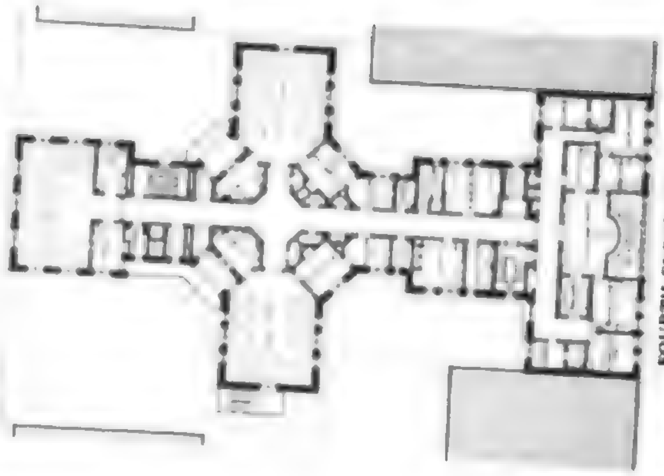


SECOND FLOOR PLAN

NEW YORK ORTHOPAEDIC DISPENSARY AND HOSPITAL, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS

DISPENSARY



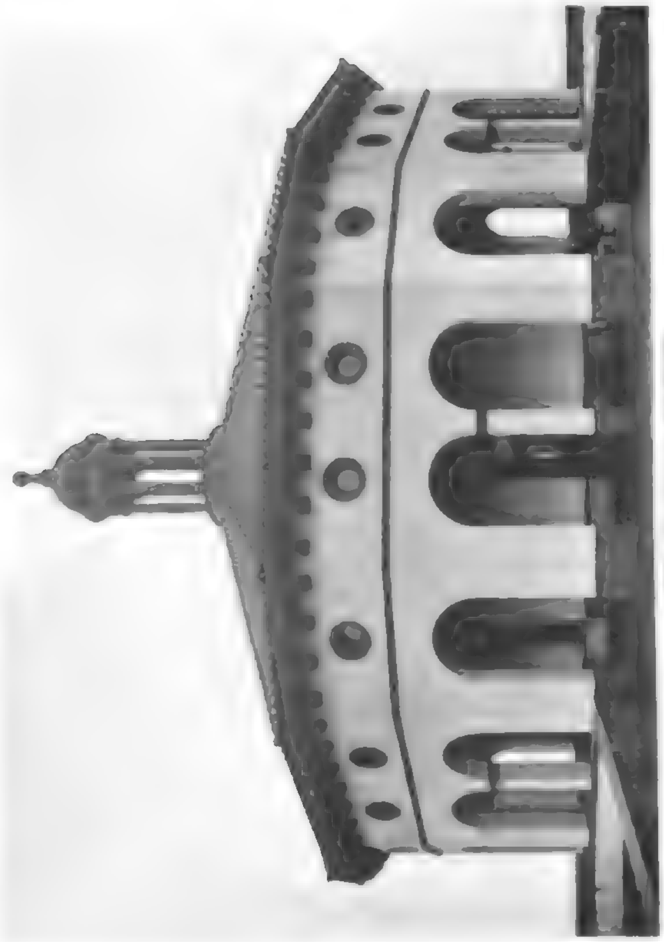
FOURTH FLOOR PLAN

THIRD FLOOR PLAN

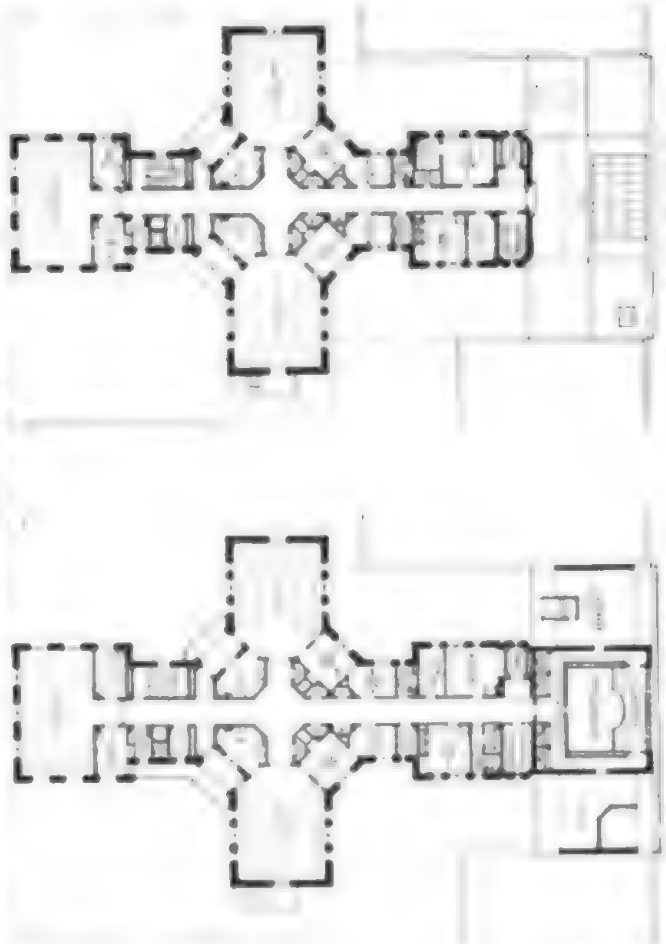
DETAIL OF ENTRANCE

NEW YORK ORTHOPAEDIC DISPENSARY AND HOSPITAL, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS



VIEW OF LOGGIA ON ROOF



SIXTH FLOOR PLAN

FIFTH FLOOR PLAN

EAST [illegible]TH STREET FACADE

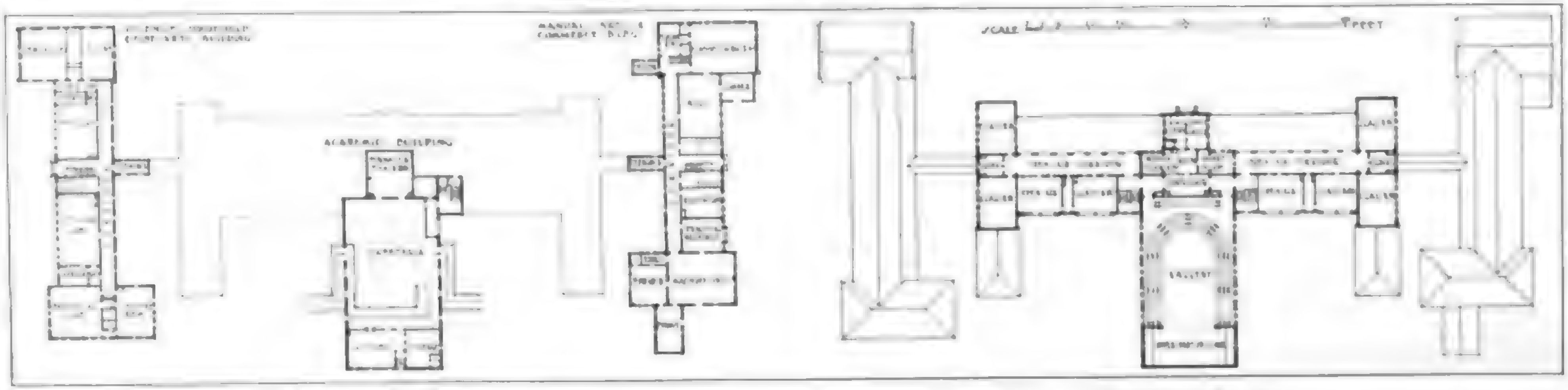
NEW YORK ORTHOPAEDIC DISPENSARY AND HOSPITAL, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS

TOWER AND ENTRANCE PAVILION OF ACADEMIC BUILDING

HIGH SCHOOL GROUP, SANTA MONICA, CAL.
ALLISON & ALLISON, ARCHITECTS

GENERAL VIEW OF ACADEMIC AND MANUAL ARTS BUILDINGS



BASEMENT FLOOR PLAN

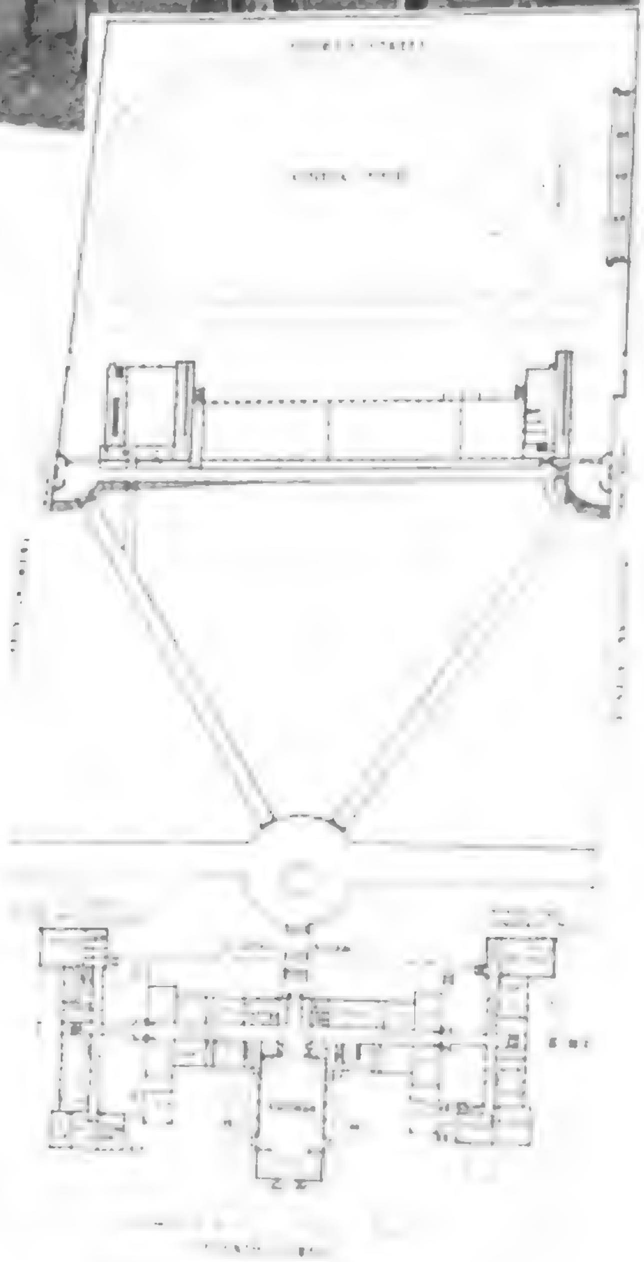
SECOND FLOOR PLAN

HIGH SCHOOL GROUP, SANTA MONICA, CAL.

ALLISON & ALLISON, ARCHITECTS

SCIENCE AND FINE ARTS BUILDING

DETAIL OF END PAVILION, ACADEMIC BUILDING



FIRST FLOOR AND PLOT PLANS

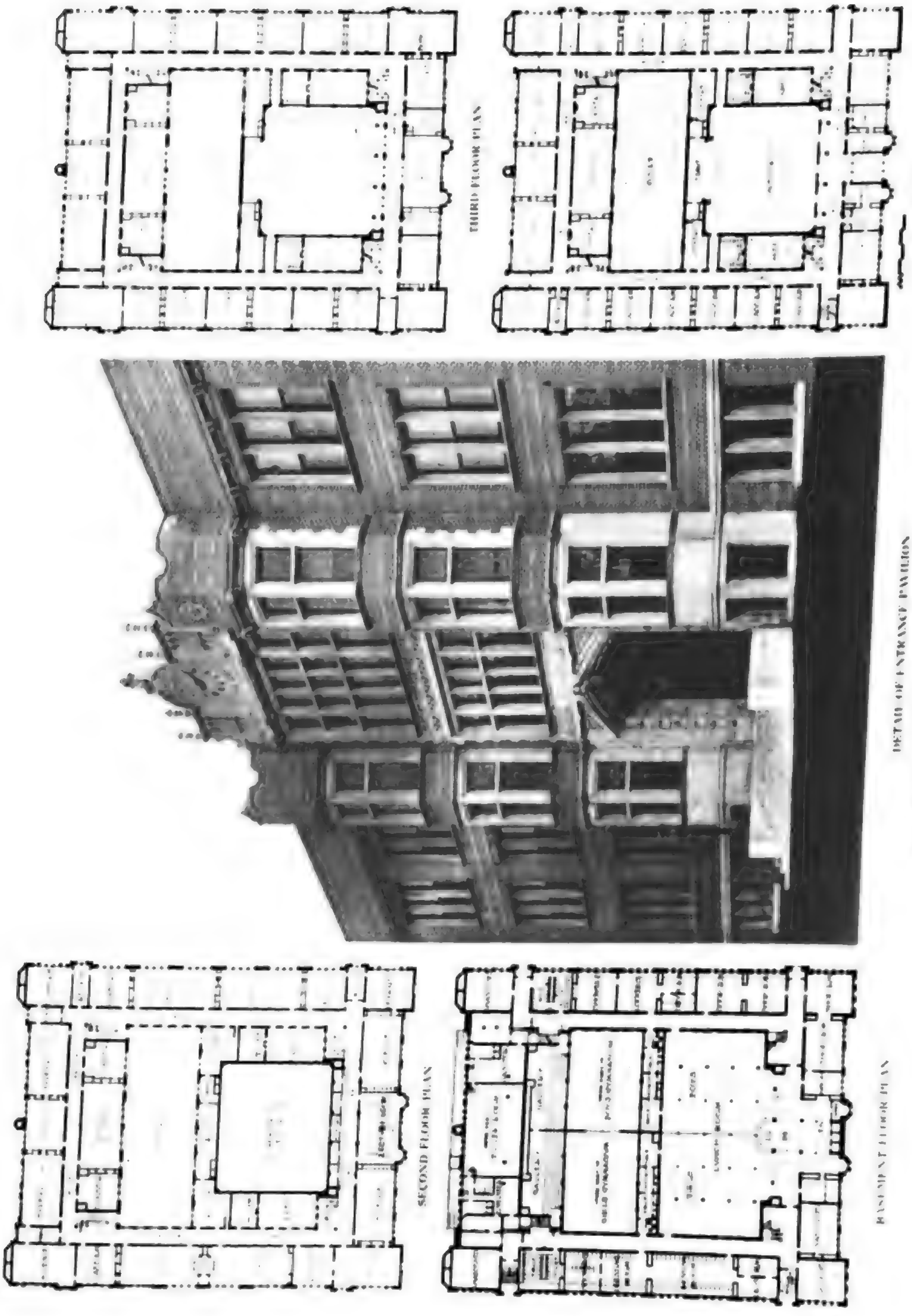
HIGH SCHOOL GROUP, SANTA MONICA, CAL.

ALLISON & ALLISON, ARCHITECTS

GENERAL VIEW OF PRINCIPAL FACADE.

HIGH SCHOOL OF COMMERCE, SPRINGFIELD, MASS.

KIRKHAM & PARLETT, ARCHITECTS.

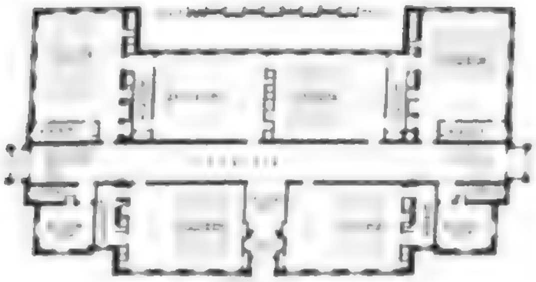


DETAIL OF ENTRANCE PAVILION
HIGH SCHOOL OF COMMERCE, SPRINGFIELD, MASS.
KIRKHAM & PARLETT, ARCHITECTS.

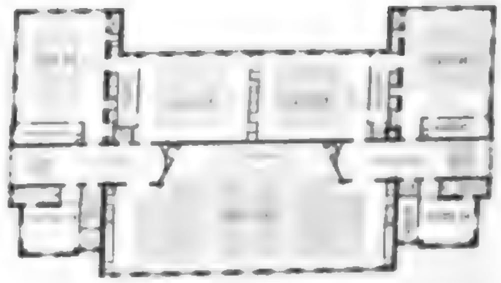
GENERAL VIEW OF PRINCIPAL FAÇADE

GRADE SCHOOLHOUSE, FRAMINGHAM, MASS.

CHARLES M. BAKER, ARCHITECT

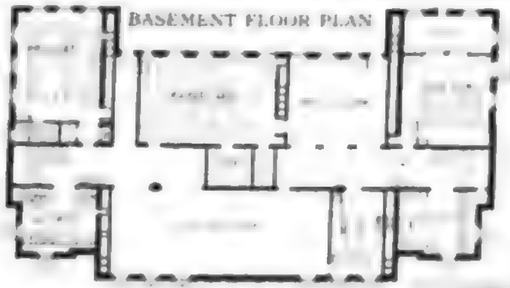


FIRST FLOOR PLAN



SECOND FLOOR PLAN

FRONT ELEVATION



BASEMENT FLOOR PLAN

VIEW OF SIDE AND FRONT

GRADE SCHOOLHOUSE, FRAMINGHAM, MASS.

CHARLES M. BAKER, ARCHITECT

ENTRANCE FRONT

HOUSE OF C. A. GOODWIN, ESQ., HARTFORD, CONN.

LA FARGE & MORRIS, ARCHITECTS

GARDEN FRONT

FIRST FLOOR PLAN

SECOND FLOOR PLAN

THIRD FLOOR PLAN

HOUSE OF C. A. GOODWIN, ESQ., HARTFORD, CONN.

LA FARGE & MORRIS, ARCHITECTS

DETAIL OF DOORWAY

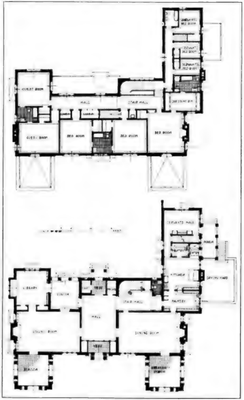
HOUSE OF DANIEL ENGLAND, ESQ., PITTSFIELD, MASS.
ALBRO & LINDEBERG, ARCHITECTS

STREET FACADE

HOUSE OF DANIEL ENGLAND, ESQ., PITTSFIELD, MASS.

ALBRO & LINDEBERG, ARCHITECTS

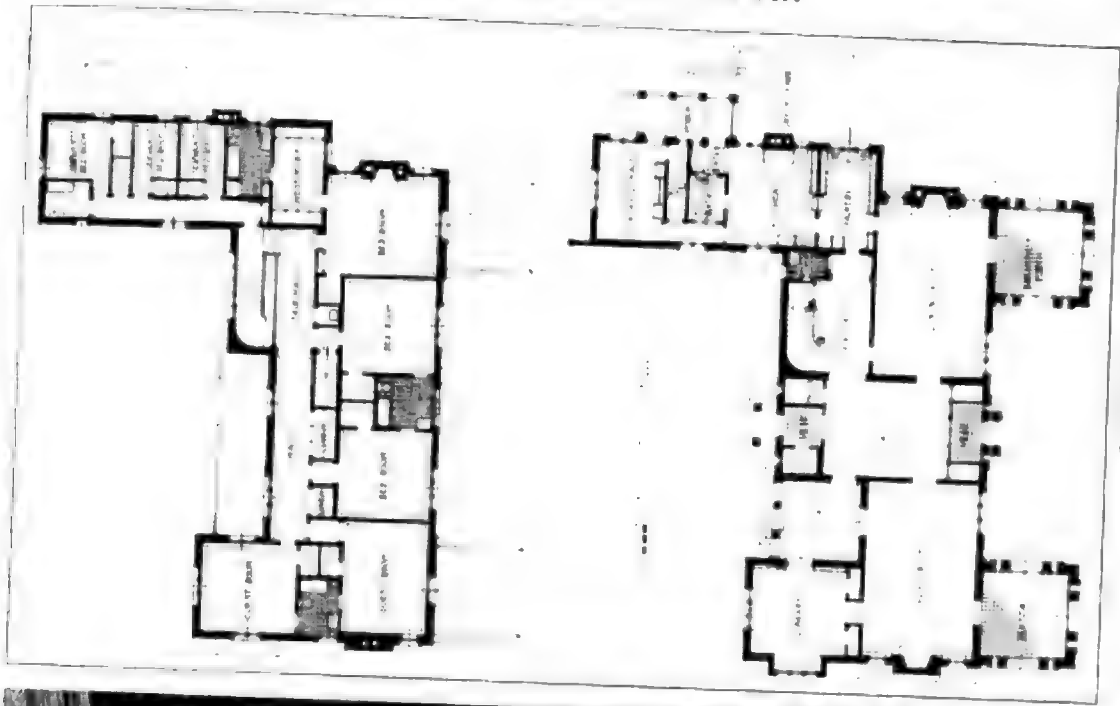
DETAIL OF MANTEL IN DINING ROOM



FIRST FLOOR PLAN

HOUSE OF DANIEL ENGLAND, ESQ., PITTSFIELD, MASS.

ALBRO & LINDEBERG, ARCHITECTS



FIRST FLOOR PLAN

DETAIL OF MANTEL IN DINING ROOM

HOUSE OF DANIEL ENGLAND, ESQ., PITTSFIELD, MASS.

ALBRO & LINDEBERG, ARCHITECTS

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS.

PLATE SEVENTEEN.

A GREAT deal of the charm of the architecture of early New England was obtained by very simple means — a judicious use of carved wood or composition ornament, well designed mouldings, and a fine sense of scale and proportion. It is this simple, dignified character which the modern architect so highly appreciates, yet it is the most difficult quality to reproduce in modern work.

The mantel shown above is composed of simple elements, yet it has the same mark of distinction that is seen in the most elaborate of the examples of Samuel McIntire's work which are preserved. The interest centers about the frieze, which is ornamented by a series of grooves and applied composition ornament on the plain surfaces. The same motive is carried out in the room cornice, bringing the mantel into intimate relations with the whole room. The single bead which finishes the wood fascia against the cement facing is worthy of note, for it is much more effective than any strongly defined moulding could ever be. The mantel shelf unfortunately has a heavier appearance than when it was built, owing to the addition of another member to give more shelf room.

In a room in this house now used as a kitchen, but formerly a dining room, there is a very interesting cornice and dado treatment, details of which are given on the following page. They are built of wood and the decoration is effected by grooving, reeding and other simple forms of carving.

CHAMBER MANTEL, CROWNINSHIELD, DEVEREUX HOUSE, SALEM, MASS.

Built in 1805.

MEASURED DRAWING ON FOLLOWING PAGE.

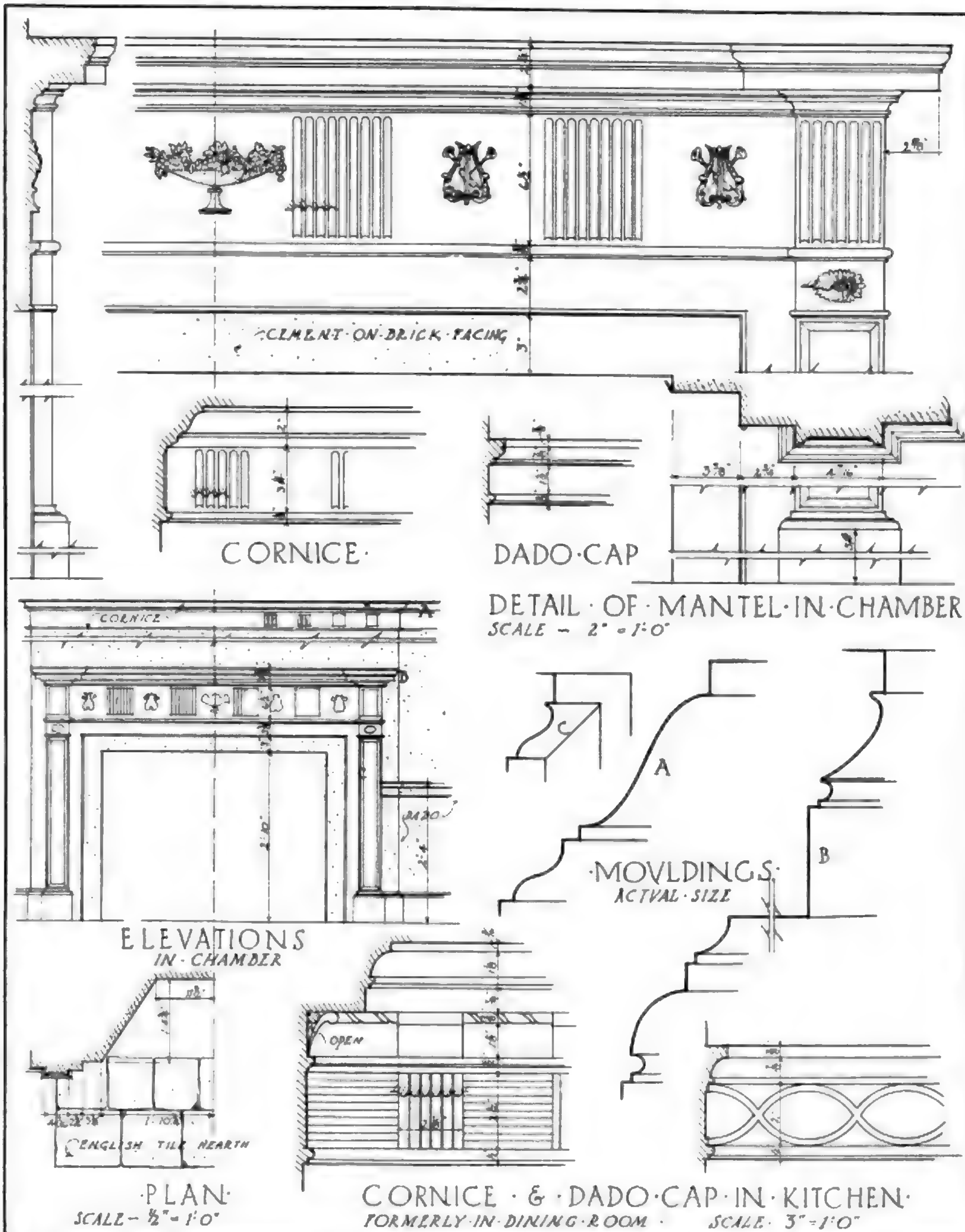


PLATE 17
MARCH 1916

DETAILS FROM CROWNINSHIELD-DEVEREUX HOUSE – SALEM MASS
SAMUEL McINTIRE ARCHITECT DATE 1805

MEASURED & DRAWN BY GORDON ROBB

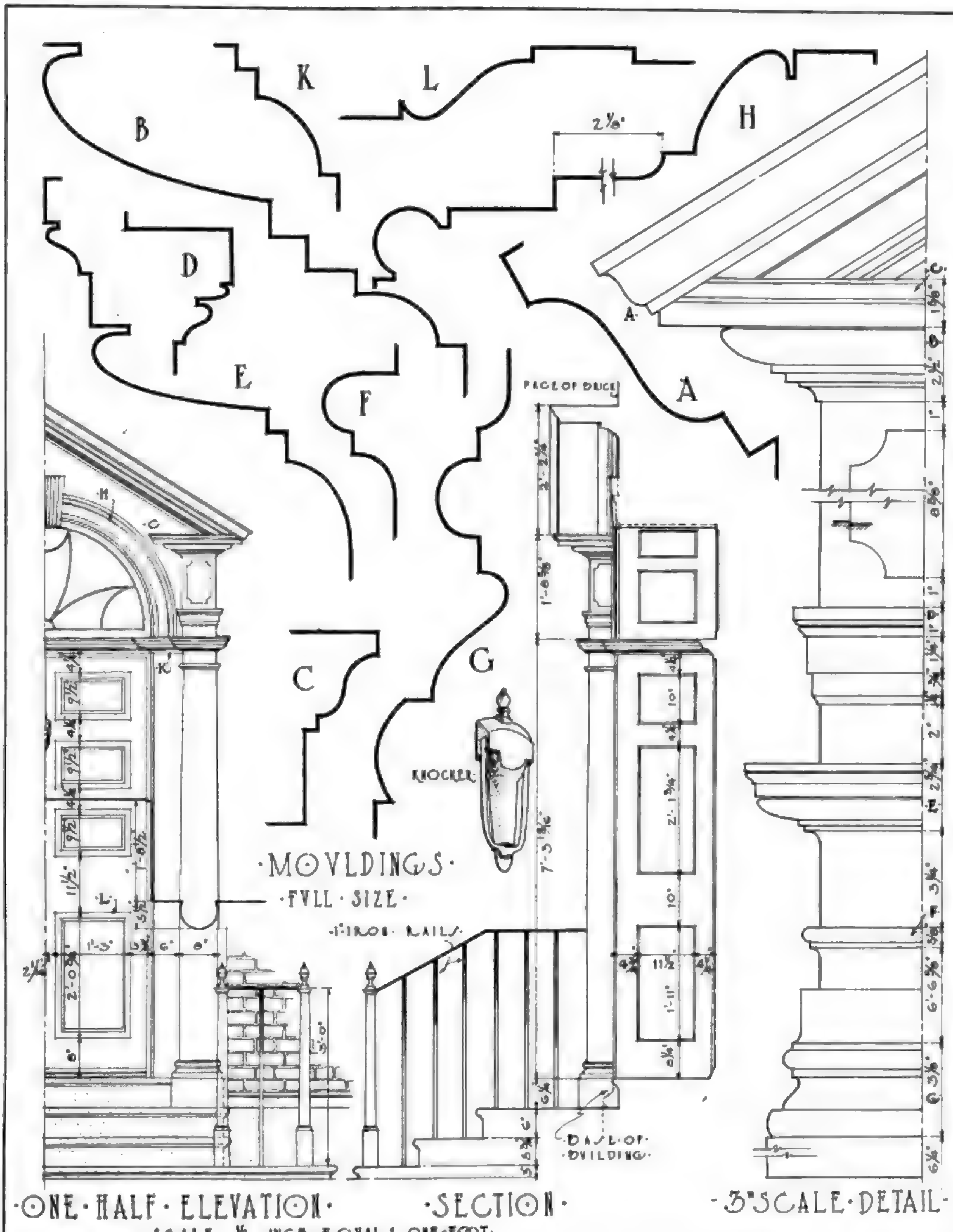


PLATE 18 MARCH 1916	·DOORWAY ~ SNOWDEN·HOVSE· ·ALEXANDRIA·VA· ·DATE·1790· ·BVILT·BY·THOS·VOWEL·	·MEASVRED & DRAWN·BY· ·J·L·KELSTER···O·J· ·MVNSON·&·J·A·WEBER·

PLATE EIGHTEEN.

THIS quaint doorway of excellent proportions presents very original details with its wide projecting yet thin cornice, the deep frieze, and stunted architrave. The arrangement and shape of the panels of the door are both unique and pleasing. The arched doorway and the columns and pediment are brought into close relation by the moulded course just above the door, which is a continuation of the mouldings forming the column capitals. The leaded fan light has an unusual and interesting pattern.

The paneling of the door jambs which follows the main divisions of the door is flush with the rails and defined by a single bead.

DOORWAY, SNOWDEN HOUSE, SOUTH LEE STREET, ALEXANDRIA, VA.

Built in 1790.

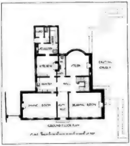
MEASURED DRAWING ON PRECEDING PAGE

An English Housing Scheme.

DUCHY OF CORNWALL ESTATE AT KENNINGTON, LONDON; ADSHEAD & RAMSEY, ARCHITECTS.

By R. RANDAL PHILLIPS.

FROM the architectural point of view there has been in England more than enough discussion of housing practices during recent years. Not that too much attention can ever be directed to the solution of one of the greatest problems of the present day; not that continued discussion of housing topics is fruitless; but because there has been a superabundance of general talk about housing, so mixed up with ethics, morals, and a hundred other things that the real matter of the houses themselves has been very largely swamped; and when an attempt has been made to give architectural expression to the varied fancies and whims of housing enthusiasts, the result has generally been indifferent. Moreover, so much attention has been directed in England to housing schemes on semi-rural lines, that the equally important subject of urban housing has been left in the hands of borough engineers and similar municipal officials, whose architectural capacity is not of a high order.



Plan of St. Anselm's Vicarage

Being concerned in this article with a town housing scheme, we may pass all that belongs to the "garden city" with the brief remark that its ideals, and the buildings in which these ideals are expressed, must necessarily differ so acutely from the scheme for an urban area as to be apart altogether from consideration in connection with the latter. The "garden city" ideal, for instance, counts it necessary, or at least extremely desirable, that every house shall stand within its own plot of ground, with a strip of garden in front or at the back, or both, where a taste for country life can be indulged. All that is impossible in the midst of a town where the communal garden is the best that can be obtained. As has been said, there are only two ways of housing people, — either by spreading them out thin, or by piling them on top of one another; in other words, you can put them into cottages covering a large area, or you can put them into tenements. In the case of the houses on the Duchy of Cornwall Estate at Kennington, London, S. E., built for the Prince of Wales, as Duke of Cornwall, the former alternative has been adopted; and any one who will study what has been done on this estate will recognize not only the architectural quality that has been given to quite simple little buildings, but also the proper town system on which the estate has been developed. Kennington to-day is a

St. Anselm's Vicarage, Kennington, London, S. E.

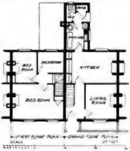
Adshead & Ramsey, Architects

General View of Workingmen's Houses on Courtenay Square, Kennington

poor quarter of London, though, like many another part, it was once esteemed as a very respectable residential district; but, as Swift makes Nevermont say in his "Polite Conversation", "Why, Sir John, London has gone out of town since you saw it." London is forever going out of town, and that is the explanation for the drop in social status which certain districts have experienced.

Whatever may be the merits of housing outside the confines of the town, it is yet the fact that large numbers of people are bound to live close to their work; and such people have not the time to spend in making what may be quite a journey night and morning. In these circumstances it becomes necessary to provide them with suitable housing in the midst of the town where they are occupied. At the same time it is necessary to remember that there are many people to whom the lure of the country means little, who prefer rather to live a town life — in which connection we may note, in passing, that the Parisians are a far greater town-loving people than Londoners are. Now the problem is to provide these people with suitable housing accommodation. The tenement is certainly not the ideal arrangement; the tenement, in fact, is generally a forbidding place, where all sense of individuality is swallowed up in a dull block of brickwork. On the Duchy of Cornwall Estate at Kennington there is no such thing as a tenement. Instead, we find pleasant little streets and squares, spick and span in appearance, all forming part of a general scheme, yet all and each marked by a touch of individuality and variety which gives a lively air to the whole district. The architects, Messrs. Adshead & Ramsey, have not attempted to do anything startling in the way of architectural design. We are not affronted by what may be called "queer" architecture. They have had to pull down a large area of old houses dating from the end of the eighteenth century and the beginning of the nineteenth century, and with rare perception and remarkable ability they have translated into their own new houses the spirit of the old. It requires a clear mind to do this. The temptation to make individuality predominant is so strong that most architects are unable to resist it. No such mistake has been made at

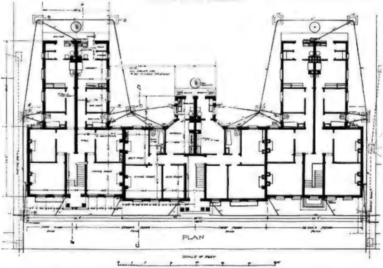
Detail of Workingmen's Houses on Courtenay Street



Plan of Workingmen's Houses on Courtenay Square

Detail of Workingmen's Houses on Courtenay Square

GENERAL VIEW OF EXTERIOR



GROUP OF MIDDLE CLASS FLATS, CHESTER STREET, KENNINGTON, LONDON, S. E.

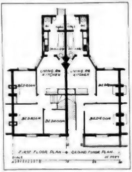
ADSHEAD & RAMSEY, ARCHITECTS

Pair of Single Family Houses on Courtenay Street

Kennington. There are streets of houses, squares of houses, two story cottages, flats for workmen, flats for middle class tenants, a hostel for old people, a *crèche* where babies can be left by mothers who have to go out to a day's work, shops, a church; and while all these are treated differently, and have an essentially modern air, they are all part and parcel of one common style of design, and so possess the merit which belongs to every harmonious scheme. As Professor Abercrombie has pointed out, instead of ransacking Holland or facsimiling Cheshire "black-and-white" the architects have dared to dispense with travel sketches and to hide their store of exotic architectural whimsies.

"A couple of houses in this quiet London manner may not be noticeable; it is only in extended use that its fitness and charm become apparent. It is, therefore, doubly fortunate that the Kennington estate provides a sufficiently continuous quantity for its qualities to be rightly appreciated. The more emphatic treatment of eaves and roll tiles lends a distinctive character to the Vicarage and the Old Tenants' Hostel that, without symbolical laboring, appears subtly suitable; delicate balconies, enriched panels, balustraded parapets, and columnar porches give the flats an air of refinement that wholly dissociates them from the necessitous tenement; the trellis porch, interlaced bars, and a squat proportion produce in the new square the homely aspect of the Englishman's own house. The way these differentiating characteristics have been seized upon by the authors, and, within the frame of a harmonious style, worked so as to express the inner significance of these buildings, promises well for the further use of this medium. Again, within the same type — as, for example, the flats, of which several blocks have been erected — there is scope for endless variety of surface treatment, in the judicious disposal of bands and panels, by which an individual interest is given to blocks of similar outline form. And what is particularly notable is the way in which the architects have combined refinement and delicacy of detail with an absence of frigid scholarship. The entrance to the Old Tenants' Hostel is exactly where a lesser hand might have gone wrong: an archway 13 feet high, flanked by Ionic pilasters — what a chance here for pulling out the full diapason of the neo-Grec organ, and how incongruous it would have

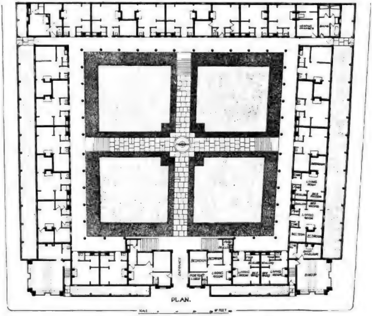
Two-Family Flat on Newburn Street



Floor Plans of Two-Family Flats

Flats at Entrance to Courtenay Street, Kennington

EXTERIOR VIEW SHOWING GROCER'S SHOP AT CORNER



OLD TENANTS' HOSTEL, KENNINGTON, LONDON, S. E.
ADSHEAD & RAMSEY, ARCHITECTS

been to the old people whose front door it is! Instead, combined with a certain largeness and breadth, reflecting its royal founder, there is a homely quality, obtained by the effortless grouping of overhanging wood cornice, cupola, bell, and weather-vane. Such architectural self-restraint is rare in these self-conscious days. . . . The importance and significance of the Kennington estate is thus twofold; it is the first example of urban housing carried out on town planning lines and conceived in no apologetic mood, as though it were a makeshift caused by the difficulty of carrying people out to the suburbs. No, this is frankly a group of town houses for town dwellers, and sets up a standard of its own, quite distinct from that of the suburb. The extent of the area dealt with, and the radical rearrangement in the proportion of built-on land to open space which is being effected in the site planning, lift this work above the piecemeal rebuilding of street blocks, which is always taking place to a greater or lesser extent. The other reason of its importance is that it is artistically sound. That this should be achieved at the outset is indeed fortunate. We know how usual is the early fumbling of a new departure — the garden suburb is only now beginning to find its permanent idiom after endless experiments. At Kennington, a satisfactory result has been obtained by the close study of a local tradition and usage which, carefully modified to suit modern requirements, was admirably adapted to its present purpose."

Entrance to Court, Old Tenants' Hostel

There is no need to go into any detailed description of the houses, for the accompanying illustrations speak for themselves. It may be stated very briefly, therefore, that they are all of brick, with artificial stone dressings, and have, for the most part, flat roofs, constructed of a waterproof material covered with gravel. All have electric light (which up to a certain consumption is included in the rent) and all have baths.

View in Court of Old Tenants' Hostel, Looking from Entrance Archway

The Ventilation of Special Rooms.

By CHARLES L. HUBBARD.

IN any general consideration of ventilation it is not possible to take into account individual rooms which, by reason of peculiar conditions, demand special equipment. In this article a number of these rooms, which vary from the usual type, are discussed and their special requirements, together with the generally accepted means of meeting them, are given special, though brief, treatment.

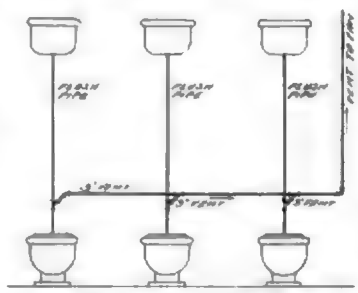


Fig. 1. Showing Use of Local Vents

Toilet Rooms. The older method of ventilating toilet rooms was by open windows or by means of general room ventilation through wall or ceiling registers connecting with flues leading outward. Later, the local vent came into use and has been considered the most effective method yet devised, especially when connected with a flue having a strong draft to insure constant circulation.

Until recently the result sought has been the removal of odors before they had a chance to spread throughout the air of the room, and all efforts have been, directed along this line. Within the last year or two special attention has been given to what constitutes the real danger from a poorly ventilated toilet. It seems to be a well established fact that the odor from excreta and gases is harmless, although unpleasant, and the real danger lies in the excretions themselves, especially if they are allowed to dry and take the form of dust.

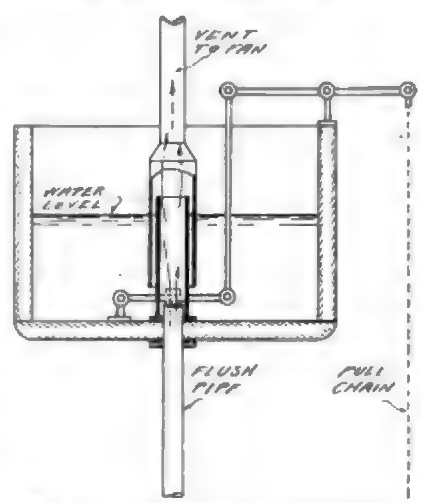


Fig. 2. Showing Vent from Flush Pipe in Tank

While the usual method of ventilation through openings or horns attached to the closet may be effective in the removal of odors, it is not always a safeguard against the spreading of dangerous germs which may be contained in the substances passing to the sewer through the closet. As a matter of fact, the usual design of closet with its local vent opening may, in certain cases, catch and hold small portions of the excreta which may spatter into it, and later discharge them into the surrounding atmosphere in the form of dust, together with any harmful germs which they may contain. In order to be perfectly safe, a local vent opening must be so placed as to make it absolutely impossible for anything to spatter into it from the closet, and this with the usual form is often a difficult thing to do. One suggestion is to make the lower portion of the flush pipe serve as a local vent also, by enlarging it and connecting it with a fan suction as shown in Fig. 1. With this arrangement the opening into the closet is kept clean through frequent flushings, and, in any case, matter which may stick to the walls of the vent opening has no opportunity to dry and turn into dust.

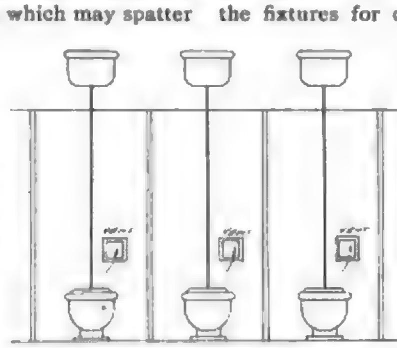


Fig. 3. Showing Independent Vent Registers

An arrangement adapted to another form of flush valve is shown in Fig. 2, in which a water sealed cap is placed over the top of the flush pipe in the tank.

A safe and often satisfactory way is to omit the horn or local vent from the closet and provide a small vent register just above the seat, as shown in Fig. 3. In this case it is entirely separate and cannot possibly pick up any dust from the interior of the closet, and a strong draft created by a fan should readily dispose of any odors which may find their way into the room. In addition to these wall vents it is well to place one or more registers in the ceiling to catch any foul air which may pass them.

Theoretically, the greater part of the ventilation from a toilet room should be through the fixtures in order to remove the odors at their source, before mixing with the air of the room. An examination, however, of a number of installations without local venting seems to indicate that it is practicable to maintain a good degree of air purity by means of wall and ceiling vents alone, provided a sufficient volume of air is handled to keep the currents moving in the right direction.

This may easily be done in the case of schools, factories and other buildings, where the toilets are used by a large number of people, by the use of an exhaust fan of sufficient size to provide a complete air change once in six or seven minutes. The common practice of providing a closed chamber at the rear of the fixtures for concealing the connections and serving as a common collecting chamber for the local vents is ideal, in a way, for the removal of odors; but it is also ideal for collecting and retaining any germ-bearing dust which may form in the vent outlets from the closets. Like all theories, the above may be carried to extremes far beyond those necessary for reasonable safety; but it is well to consider the possibilities noted and plan the ventilating system in such a manner as to eliminate them so far as possible.

Locker Rooms. Closely connected with the toilets of a school, shop, or gymnasium are the locker rooms. Although clothing may contain harmful germs in certain cases, they are not likely to be carried by air currents passing over them at moderate velocities. In this case the best results are obtained by local ventilation, either by means of a fan or under gravity circulation. A common arrangement is shown in Fig. 4, which may be improved in certain cases by running a couple of lines of steam pipe through the lower part of the lockers below the clothing for use in rainy weather when the lockers may contain wet garments.

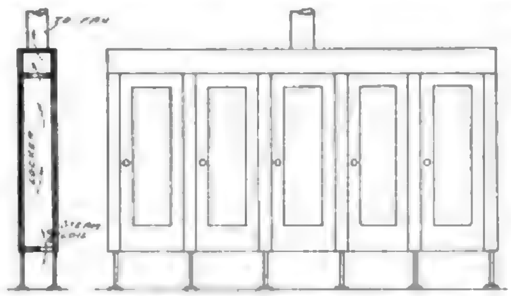


Fig. 4. Method of Ventilating Lockers

In many cases, room ventilation alone is depended upon for work of this kind, but the arrangements described are more effective in rooms containing a large number of lockers.

Here, as in the case of toilet ventilation, a fan is to be preferred to natural draft, as there is considerable resistance to air flow, and an even velocity through the entire system of lockers is best secured by carrying a fairly strong suction on the main discharge duct and regulating the flow from each locker, or each series of lockers, by means of an adjusting damper. For a comparatively small number of lockers a heated flue will usually provide sufficient draft for satisfactory results. With this arrangement larger ducts should be employed, as the velocity of flow will be considerably less than with a fan. The volume of air removed from a locker room should be about the same as from a toilet. In both cases the air supply is best drawn in through louver openings, or grilles, connecting with corridors or similar rooms, as it is desirable to maintain a slight vacuum within them in order to prevent any outward leakage which might carry odors to other parts of the building.

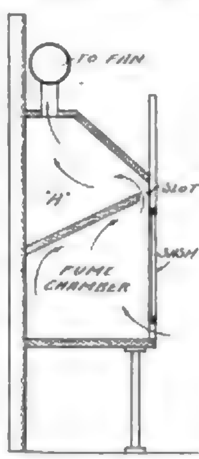


Fig. 5. A Type of Laboratory Hood Insuring Good Ventilation

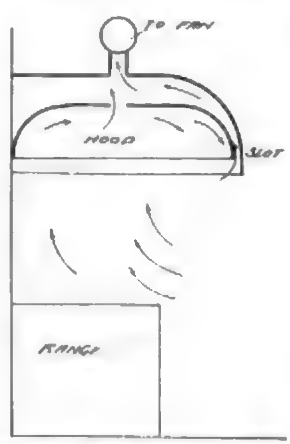


Fig. 6. Showing Method of Securing Local Ventilation Through a Range Hood

Chemistry Laboratories. These require special treatment owing to the fumes given off by various chemical processes. Work of this kind should always be done under a hood, a very efficient form of which is shown in section in Fig. 5.

This consists of a fume closet, with a porcelain or slate bottom, and a curved or slanting top, which deflects the gases to a narrow slot at the front, through which they are drawn at a comparatively high velocity by means of a fan connecting with the duct "A", which is common to all of the hoods in the same row. Each fume closet is provided with a sliding sash in front, which is left open for 2 or 3 inches when the closet is in use in order to provide an air supply sufficient to carry off the fumes. In general, the greater part of the room ventilation should be through the hoods, although wall registers are necessary, especially in school laboratories, for use at such times as the hoods may not be in service.

The demonstrator's desk or table should be provided with a strong down draft opening for carrying away fumes which may be generated during demonstrations before the class. A hood cannot be used in this case as it would obstruct the view too much. Fans for chemical ventilation should be constructed with copper blades or coated with a preparation which is impervious to the fumes given off in the hoods. The connecting ducts and flues should be coated on the inside with the same material or be constructed of tile.

Kitchen Ventilation. The kitchen should be furnished with a strong, outward ventilation to prevent the odor of cooking from reaching other parts of the building. The greater part of the ventilation should be local rather than general, in order to remove the odors as soon as generated. This applies to the range hood, vegetable steamers, coffee and tea urns, etc. Local ventilation, however, should be supplemented by sufficient general ventilation to remove the heated air from the upper part of the room when desired, the general ventilation to be controlled by dampers under the direct charge of someone employed in the room. The fresh air supply may usually be taken, in part at least, from adjacent rooms, such as serving room, servants' dining room, etc., making the discharge from the kitchen so strong that there will be no tendency to create back drafts. Cool outside air is best admitted near the ceiling, in front of the range and ovens, through inlets which may be made to discharge in any direction desired. Under ordinary conditions this air supply will not need to be warmed, there being sufficient heat in the upper part of the room to prevent uncomfortable down drafts. In large kitchens, where there is likely to be a considerable volume of air required in cold weather, it is well to provide a heater or coil in the supply duct to temper the air before admitting it to the room.

For small and medium size kitchens sufficient air will enter through the openings provided, if there is a good outward draft through the vents.

In very large hotel and restaurant kitchens it is usually necessary to furnish a supply fan, taking care that the air introduced in this manner does not exceed about 60 per cent of that exhausted. Efficient hood ventilation depends upon the removal of air at a high velocity through

a comparatively small opening, as has already been described in connection with chemistry laboratories. This condition may be secured in practice by constructing a hood as shown in Fig. 6, in which the air is drawn partly through a narrow slot about an inch in width, extending entirely around the perimeter, supplemented by one or more small openings in the top, as indicated in the diagram. This same general scheme should be carried out in the construction of hoods for other pieces of apparatus requiring local ventilation.

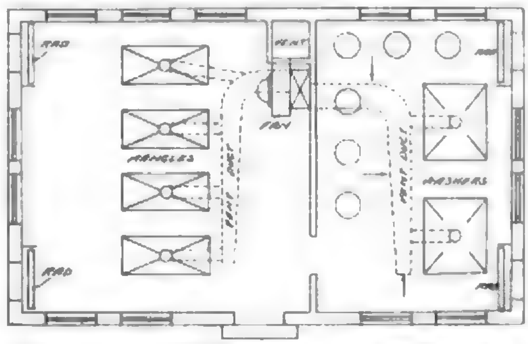


Fig. 7. Plan of a Typical Laundry, Showing Arrangement for Good Ventilation

All ducts and flues beyond the range connections should be made fireproof on account of the inflammable coating formed on the inside from the vaporized oils which are given off in cooking. When constructed of metal it is best to use black iron as heavy as No. 12, and insulate the outside of the flue with a couple of inches of plastic material, in the same manner as a smoke pipe from a boiler is insulated. All discharge ventilation of this kind requires the use of a fan in order to secure the necessary air velocity. A fire damper, held open by a fusible link, should be provided that will shut off the flue automatically and at the same time stop the fan.

A kitchen should be provided with sufficient air to produce from fifteen to eighteen changes per hour, if the room is less than 14 feet in height.

Dining Rooms. The dining room of a large hotel or restaurant should be provided with a positive air supply by means of a fan, either in connection with other rooms of the building or independently as is found most convenient. If the air is taken from the general ventilating system at a temperature of 70 degrees, heat must be supplied either by placing supplementary heaters at the bases of the flues or providing direct radiating surface in the rooms.

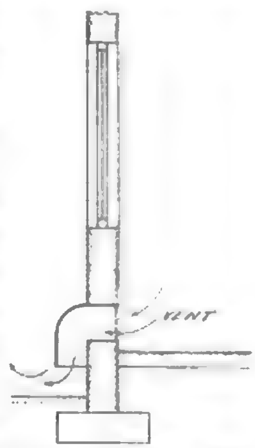


Fig. 8. Vent to Outside at Floor Level of a Garage

When the dining room is ventilated by a separate apparatus the entire heating may be done by the main heater at the fan, sending the air to the room at a temperature sufficiently high to offset the losses by transmission and leakage, thus simplifying the arrangement and doing away with a secondary or direct radiating surface.

In general, the air is best introduced at an elevation either in the window sills or through registers in the outer walls. When the system is used in the summer for cooling, separate inlets are sometimes provided near the floor which may be thrown into use by means of switch dampers. The reason for this is to avoid cool drafts from the falling air, which are likely to occur when cool air is introduced from above.

Exhaust ventilation should be partly at the floor and partly at the ceiling to give a slight upward current in case there is smoking in the room.

The air volume for a dining room should be based upon the maximum seating capacity, allowing, at least, 40 cubic feet per hour per occupant.

Bar and Smoking Rooms. The air flow from these rooms should be strongly outward to prevent smoke and the odor of wines and liquors from passing to other parts of the building.

This result is easily brought about by the use of direct, indirect radiators through which the outside air is drawn, due to the slight suction produced by the action of the exhaust fan. These radiators should be of sufficient size to warm the room in addition to meeting the ventilating requirements imposed upon them. Rooms of this type should have at least eight changes of air per hour.

Laundry. This is an important room in an institution or hotel and should receive careful attention in the matter of ventilation. As the air in a laundry contains a high percentage of moisture and is likely, at times, to become overheated, the conditions are such as to have a decidedly enervating effect upon the occupants unless the room is well ventilated. While open windows and roof ventilators may work satisfactorily in warm weather, the introduction of cold air will produce excessive condensation and also set up dangerous drafts.

The best results are obtained by removing the warm, moist air from the upper part of the room and admitting tempered air near the floor.

Air is best removed by means of an exhaust fan, and a considerable portion should be taken from hoods placed over washers and mangles. In addition to this there should be a certain amount of general or room ventilation through vent registers placed in the side of the main duct. Fresh air may be drawn in through shallow coils or radiators called induction heaters, which are placed either in front of windows or special openings.

The general arrangement of the ventilation for a laundry is shown in diagram in Fig. 7.

Garage. The two points to be considered in the heating and ventilation of a garage are the absence of fire and the removal of gasoline vapor through openings near the floor. In case of a private garage located near the main house, the simplest method is to carry underground pipes from the house boiler for supplying a radiator of sufficient size for heating the building. The only precaution in this case is to make tight joints where the pipes pass into both buildings, in order to prevent any possibility of inflammable gas working back into the basement of the main house.

When the garage is located at a considerable distance from the main house, or when a furnace system is employed, it will be necessary to provide a separate heating outfit. This may be either hot air, steam, or hot water, as

most convenient, the only particular requirement being that the stove or boiler be placed in a wing outside the garage proper, with a separate outside door and no communication with the main portion except for the pipes or flue leading from the heating plant.

Supply pipes and flues should pass through the partition 6 or 8 feet above the floor, and care should be taken to make all joints tight. Return pipes must necessarily be carried at a lower elevation; but by placing the radiator upon a shelf in the upper part of the room, the danger of gasoline fumes passing through the wall openings may be greatly reduced, as this gas is heavier than air and will fall to the lower part of the room below the returns.

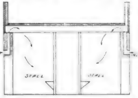


Fig. 9. Method of Ventilation Adapted to Low Stables

Vent openings, therefore, should be located at the floor, a common form being shown in section in Fig. 8.

Stable. Although the use of stables is not so common as formerly, there are many country estates where horses are kept and where suitable ventilation is necessary to secure the best results.

Theoretically a cow or horse weighing 1,000 pounds requires about 4,000 cubic feet of fresh air per hour, but it is not possible to provide this without the use of special fans and heaters, which are hardly ever resorted to in practical work of this kind.

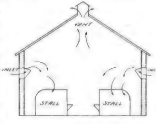


Fig. 10. Showing One Method of Stable Ventilation

The difficulty experienced in stable ventilation is due to the fact that animal heat is relied upon for maintaining the proper temperature (35 to 45 degrees), and this necessarily limits the amount of fresh outside air which can be admitted in cold weather without injury to the stock.

Very good results, however, may be secured by a suitable compromise, depending upon the outside temperature. There are various methods employed for the supply and removal of air, one of which is shown in Fig. 10. In this case air is admitted through side windows hinged at the bottom and having the triangular openings at the sides filled in so that the air will enter as indicated by the arrows.

This, however, should not be of sufficient volume to cause dangerous drafts upon the animals, and must be regulated according to outside conditions by varying the amount of sash opening.

Discharge ventilation is through monitor windows and is due to rising air currents caused by the animal heat. Another method, similar in principle, is shown in Fig. 9, and is adapted to low stables. In this case air leakage through doors or special openings into other parts of the building are depended upon for discharge ventilation. Another method is illustrated in Fig. 11, in which the air is delivered to the stalls above the mangers through special uptake flues.

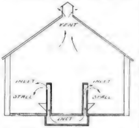


Fig. 11. Method of Stable Ventilation with Special Uptake Flues

The principal feature of this arrangement is the supplying of air to the uptakes through a long underground duct open at the ends.

The temperature of the earth 6 feet below the surface is considerably above that of the outside air in extremely cold weather, and in its passage through the duct the air temperature is raised somewhat before admission to the stable.

Entrance Gates, High School Group, Santa Monica, Cal.
Allison & Allison, Architects

PLATE DESCRIPTION.

HIGH SCHOOL GROUP, SANTA MONICA, CAL. PLATES 37–39. This group of school buildings is indicative of the broad scope upon which California authorities have entered into the development of public school education. They have perhaps paid greater attention to the teaching of special trades and occupations than the educators of any other section of the country. In the development of this educational system there has been evolved a type of school building which meets the varied requirements from the teaching standpoint and is most appropriate for the climatic conditions.

The Santa Monica School has a large tract of ground and this permitted the segregation of the principal departments in separate buildings. The academic building forms the center of the group and contains the administration unit, class rooms for academic studies, and a large auditorium which is so arranged that it may be used for social and civic purposes aside from its school use. The second floor has a series of open-air class rooms, the south side of each being entirely open and only protected by awnings in wet weather.

The science, household, and fine arts courses occupy the building to the right of the main structure, and the manual arts and commercial courses occupy a building similar in size and arrangement to the left. These buildings, because of the contour of the land, are located at a grade lower than that of the academic building. The second floors are on the level of the first floor of the main building and direct communication between all the buildings is had at this level. In the manual arts building there are rooms for bookkeeping, typewriting, shorthand, and a section devoted to applied arts and mechanical drawing on the second floor. On the same floor of the science building there are three drawing class rooms, sewing and millinery rooms, and the domestic science department comprising a large cooking room, laundry, and a complete model flat.

Because of the ample area of the lot, boys' and girls' gymnasiums are located in separate buildings in close proximity to the athletic field. They are separated by two tennis courts and an exercise court for boys. The boys' building has only a locker room, with showers, etc., and a bowling alley; but the girls' building, in addition to these features, has also a gymnasium 44 by 70 feet.

HIGH SCHOOL OF COMMERCE, SPRINGFIELD, MASS. PLATES 40, 41. This school is designed to accommodate 1500 pupils and in plan follows the generally accepted arrangement in large schools of placing the auditorium in the center of the building with easy access from the principal entrance. This hall will seat all of the pupils. An unusual feature of the plan is the placing of the gymnasium in the sub-basement. It occupies two floors in height and is lighted by large skylights at the base of an interior court. This court gives an opportunity on the upper floors to have a double row of class rooms in the rear of the building.

For a plan of such large and compact area, the lighting of corridors and inside rooms is especially well considered. Two smaller light courts are at the front of the building on either side of the auditorium. Around them are grouped staircases and toilets, insuring good light and natural ventilation. Skylights at the foot of these smaller courts light the lunch room in the basement, and the skylights in both gymnasium and lunch room are taken advantage of to light the basement corridors through windows in the corridor walls of these rooms. The upper corridors are lighted by windows opening on the courts.

The building is of fireproof construction with steel framing, reinforced concrete floor slabs, brick walls, and gypsum block partitions. It is built on filled ground and supported by concrete piles. The exterior is faced with dark red Pennsylvania shale brick of varying shades and trimmed with Bedford stone. The roof is of tar and gravel and all skylights are copper. The lunch room, corridor, and toilet-room floors are of terrazzo with coved bases. The basement walls are faced with white enameled brick and all corridor walls with a light gray enameled brick to a height of five feet. Staircases are iron with slate treads, with the exception of the short flight at the main entrance, which is of pink Tennessee marble.

Large locker rooms, providing an individual locker to each pupil, are located on each floor about the large court. Gymnasium suits are stored in ventilated lockers which are mounted in groups on trucks that can be wheeled into the drying rooms.

The building is heated from a battery of four boilers. The warmed air in the building, except that from the drying rooms and toilets, is washed and recirculated with automatic temperature and humidity control. Electricity for light and motor power is generated in the building.

The cost of the building, including heating and ventilating, plumbing, and electrical work, but exclusive of lighting fixtures, furniture, and movable fittings, was 19¼ cents per cubic foot.

HOUSE OF C. A. GOODWIN, ESQ., HARTFORD, CONN. PLATES 44, 45. The main axis of the house is in a north and south direction, the porch being at the southerly end and the principal entrance facing Scarborough street on the west. The walls are constructed of common bricks, which were of good quality and color, and were used as they came from the kilns without any selection. They are laid in Flemish bond and the joints raked to give texture. The exterior finish is stained oak, except window cases, etc., which are painted wood. The roof is of graduated slate with a quiet variation in color.

A point of practical interest is the arrangement of the kitchen chimney which projects from the wall of the house, allowing windows on either side. Over the range is a large ventilating flue into which is led a cast iron smoke pipe, thus forming an aspirating flue.

HOUSE OF DANIEL ENGLAND, ESQ., PITTSFIELD, MASS. PLATES 46–48. This house is located on an average sized suburban lot, and though it is in fact a detached town house, in its general spirit it shows the character of a country house. The exterior walls are of a rough textured red brick with wood cornices. The entrance doorway and the columns and panels of the loggias are of white marble. The roof is of rough variegated slate. The living room is finished in oak. The dining room is paneled in whitewood, painted, and the hall and staircase are of butternut.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE effort to obtain recognition by the government of certain obligations incurred in instituting the competition for the three buildings on the Mall in Washington, which competition had the approval of the President and Secretary of the Treasury at the time, still continues, and despite the usual fog of legal procedure, the facts seem to be as follows:

A competition was instituted and what amounted to a contract was signed by the President and a member of his Cabinet, which guaranteed that when appropriations were available the premiated competitors should be respectively employed upon the work. The competition occurred in good faith and certain architects were premiated. Time passed, the political complexion of the administration changed: the money became available for the Department of Justice Building designed by Mr. Donn Barber, and the Secretary of the Treasury, Mr. McAdoo, while stating he has no objection to Mr. Barber, shows a disposition to place the commission elsewhere, and claims the power and the right to do so if he sees fit for the public good in his own estimation.

His claim is based upon these facts as he states them:

First — At the time of the competition there was no act authorizing competitions, the Tarsney Act being inoperative.

Query — Was the act of the President and Secretary of the Treasury legitimate without consent of Congress?

Second — The requirements of the building have changed; more moneys are needed, therefore no matter what the provisions of the competition were, the facts at present make the competition plans inoperative, and the architect can therefore be changed.

Third — The terms of payment stated were that the architect was not to receive more than 6 per cent, and the implication (because nothing was stated) was that he could receive less, and it is the duty of the keeper of the Treasury to do as well as he can (that is the implication paralleling the other), thus it is his duty to bargain.

Query — Is bargaining a duty of the Secretary of the Treasury?

The fog of legal procedure has enshrouded the issue, and the final statement that an act of Congress can straighten a complication which is regrettable, etc. An Act of Congress! This is indeed a case in chancery of Jarndyce and Jarndyce in "Bleak House." Are technicalities an impregnable defense to the desire for autocratic action? What are the actual objections to the employment of Mr. Barber upon a building which he has shown his ability to design? The reasons assumed are manifestly inadequate, as Mr. McAdoo admits they do not prevent his employment. Why should Mr. McAdoo call them to his aid except to further his desire, and in that case why his desire, unless it be autocratic and personal? If that is admitted, there is naturally no appeal to an official who places his own desire before the keeping of an obligation in which both parties were acting in good faith, and the carrying out of the obligation would not be an injury. If Mr. McAdoo considers that the employment of Mr. Barber is inadvisable, why does he not state that fact and his reasons for his opinion, instead of retiring behind a series of technical possibilities, and thereby dodging the issue?

There is another element to be considered, and one that is broader than the attention to minor detail. For many years the city of Washington was an incongruous collection of unrelated units of mongrel character. These had been planned, placed, and erected without any coördination of thought and with a varied ignorance, by different departments and Congresses, with the constant statement that each and all, as they resided in Washington, and were members of the government, were preëminently qualified to treat the architectural problems of their residence. Locality of residence was a credential for knowledge in the Fine Arts.

Within some decades, men whose training and whose work has justified the request for their advice have formulated a scheme for the development of Washington. They have already proved their skill and justified their employment. It is with the approval of these men that the architects' designs for buildings are made. It is futile for any official, no matter of what rank, to place himself in opposition to accomplishment which is already recognized: for while there may be temporary obstacles, the conception of the development is too admirable to be long checked.

There is frequently a tendency to consider the various expressions of the Fine Arts as subject to the discrimination of average knowledge and taste, rather than to the appreciation of cultivated and educated good taste. The assumption carries with it a contradiction of the fact that men are but judged by their peers, and that encouragement toward the highest achievement is but obtained by the commendation of those capable of that achievement.

THE New York State Association of the American Institute of Architects held its annual convention in Albany, February 24, at which time resolutions were adopted protesting against the government heat, light, and power plant, the erection of which has been started on the Potomac River near the Park in Washington, D. C. The Association recommends that before the work further proceeds, the National Art Commission should make a thorough investigation into the matter, obtaining competent advice, and give adequate consideration to the sites more appropriately located.

THE activities of architects outside the confines of their profession have recently been augmented by two New York architects, George S. Chappell and Kenneth M. Murchison, who are joint authors of the new musical comedy, "Come to Bohemia." Mr Murchison has written the music, and Mr Chappell the book and lyrics.

THE BRICKBVILDER AN ARCHITECTVRAL MONTHLY

APRIL
1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS

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THE BRICKBVILDER

VOLUME XXV APRIL, 1916 NUMBER 4

The New Group of Agriculture Buildings at Cornell University.

GREEN & WICKS, ARCHITECTS.

TWELVE years ago, when the scientific study of agriculture was in its infancy, the State of New York established, in connection with Cornell University, Colleges of Agriculture and Veterinary Sciences. In the years following there has been increasing recognition given to the value of agricultural training particularly; and it is only a logical outcome that this should be so, because agricultural education, correlated with study in the shop and laboratory, provides preparation for a place in the great constructive and productive industries which are now assuming the economic position in the development of this country that they deserve. The State of New York has continued to promote active interest in the study of agriculture, through financial aid, offered to county and public schools that would inaugurate agricultural courses. Its concerted effort, however, has been directed toward the development of the College at Cornell, till in this institution there is represented the collective knowledge and experience of educators who have specialized in laying the foundation and perfecting the details of this branch of education which develops vocational interest into personal efficiency.

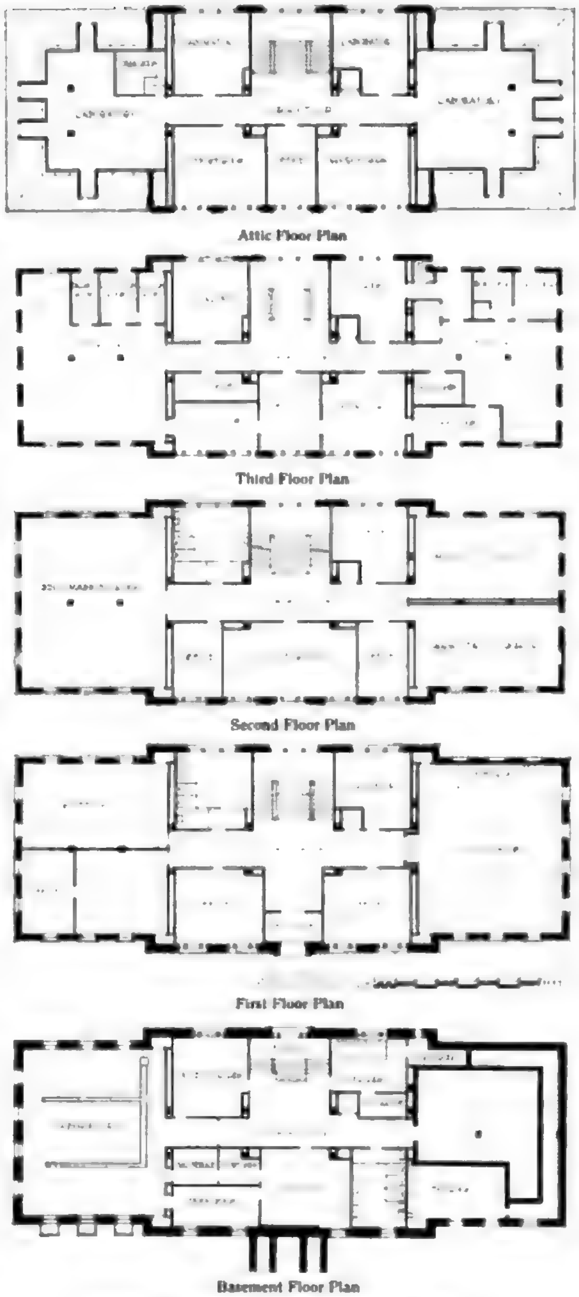
The growth of the College has been so great during the past six years that recently there have been eight new buildings constructed in addition to extensive alterations to the original buildings, and still another large building for plant study exclusively is contemplated. The original group of agricultural buildings is located on a knoll overlooking a wide expanse of field stretching into surrounding hills. A good deal of this open area has been reserved for athletic purposes, since it lies between the University Stadium and the Drill Hall. Because of their location, therefore, the Agricultural Buildings have come to command a very important position in the complete university group.

The entire property of the university has been plotted

Agronomy Building, Cornell University, Ithaca, N. Y.
Green & Wicks, Architects

and the positions of all projected buildings have been carefully determined so that in the future development of the agricultural school no haphazard results will occur. Up to the present time there has been no effort made to complete the layout of the land in the vicinity of the new buildings because of the necessity for placing all emphasis on the construction and equipment of the buildings, in order to meet the immediate demands of the school. Plans are, however, now in process for grading and planting which will insure the buildings a proper and beautiful setting.

The original group of buildings was designed by the state architect and they were built of yellow hard burnt brick with Indiana limestone trim. In the new buildings, which have been designed by Green & Wicks, aided by Professors Martin, Hebrard and Young of the College, on the Home Economics and Poultry Husbandry Buildings, a yellow rough textured brick, in general lighter in color than that of the early work but varying in shade, was selected for the exterior walls and the same limestone trim used. The architects in designing the various new buildings followed as far as practicable the style adopted in the old group so that there would not be too great a variation among the buildings of the completed group.



Agronomy Building, Cornell University, Ithaca, N. Y.

The state appropriation for the construction of the buildings was not large enough to provide funds for the erection of monumental structures of great beauty; monumental effect, therefore, had to give way to the primary consideration of providing substantial, fireproof, and practical school buildings. A definite architectural quality has nevertheless been given each of the buildings through careful study of the proportion of window openings to wall surfaces, general mass and contour, and a fortunate choice in color and texture of the constructive materials. The paucity of appropriations with which to carry out the design of important buildings is a condition with which the architect is very often confronted, and in meeting it the ingenuity of the designer is taxed to provide means of creating an architectural scheme which will indicate to as great a degree as possible the importance and dignity of the structures and at the same time bring the cost within the stipulated figures. In the case of prominent buildings which represent the State, it is unfortunate that a larger view of the importance of constructing them with the best architectural character possible cannot obtain to a greater extent.

All the buildings have brick exterior walls, steel framing, tile partitions and floor arches, concrete floors, slate roofs, and stairs. The interior finish in all cases has been carried out in as simple a manner as possible with plain plaster painted walls and plain wood trim. They are heated by a central heating plant, only half of which is now constructed. The supply pipes are brought to the different buildings underground in tile conduits having frequent concrete manholes.

Each of the buildings has been designed to provide space and equipment for the study of a definite branch of the agricultural profession. They are each equipped with laboratories and special rooms for the study of the various sciences.

A list of the buildings, with their costs, is given below:

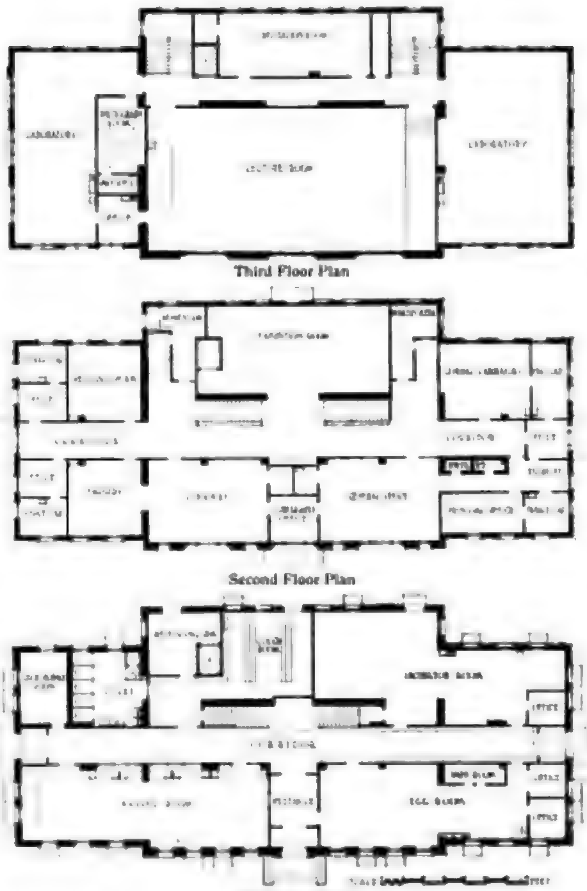
	Per sq. ft.	Per cu. ft.	Total
Forestry Building	$11.35	$ .25	$96,208.00
Agronomy Building	11.25	.25	90,000.00
Poultry Husbandry Building	12.18	.22½	88,001.85
Headquarters Building	11.50	.20½	90,982.00
Home Economics Building	11.00	.23½	133,856.75
Stock Judging Building	2.35	.08½	27,796.00
Central Heating Building			50,898.00
Auditorium and Laboratories Building	6.25	.11	132,500.00
Clinic and Hospital Building of the College of Veterinary Sciences	10.00	.16	140,544.50

The Auditorium and Laboratories Building of the College of Agriculture group and the Clinic and Hospital

Building of the College of Veterinary Sciences entailed special consideration in planning and perhaps deserve particular mention.

In building the Auditorium it was the intention that it would not only furnish accommodation for large gatherings of farmers and agricultural students, who congregate for special lectures, but also for the general use of the University at large. The building is built on the plan of a Greek hemi-cycle. It has a seating capacity of approximately 2,500 people, with a small gallery located over the corridor but not extending over the seats on the main floor. A row of columns circle the auditorium reaching from the balcony to the roof, which create with the height an imposing interior. A wide corridor extends around the main floor from which radiate aisles to the seats; opposite each aisle there is a direct exit from the corridor to the exterior portico, so that the hall can be quickly emptied or filled. This is a very important requirement in a university hall where it is necessary to have a great many audiences during the day, and besides being a practical arrangement, the spectator is furnished an impressive sight in seeing the hall filled quickly through these various entrances.

In the basement all the available space outside of that required for housing the ventilating system has been given over to laboratories which may be entered independently of the auditorium from the rear of the building where the grade is lower than at the main entrance. The building commands an important position among the others of the group because of its size and scale, and the imposing effect which the style of architecture adopted lends to the façade. A special interest has been given to



Poultry Husbandry Building, Cornell University

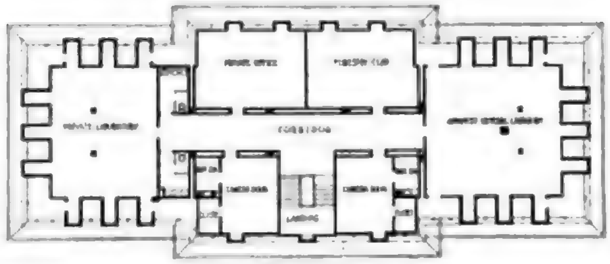
Poultry Husbandry Building, Cornell University, Ithaca, N. Y.

Professors Martin, Hebrard and Young, Architects. Green & Wicks, Supervising Architects

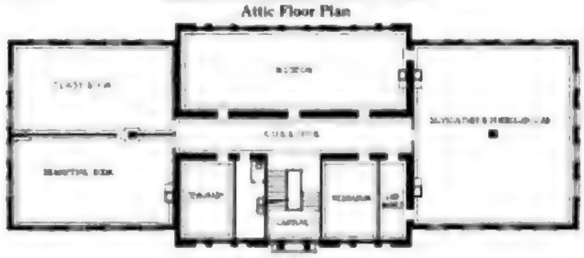
the circular arcade by means of the open timbered roof and the frieze above the columns, which has a pierced ornamental pattern, the detail of which is repeated in the copper *cheneau* on the roof.

The Clinic and Hospital Building was built for the use of the State Veterinary College in the study of the diseases of animals. It is situated in close proximity to the main agricultural group, and although of a slightly different style of architecture, it harmonizes with the latter because the constructive materials are the same in all the buildings. The plot on which it is built slopes to the rear, so that it was possible to have entrances on two levels. This fact also determined to a large degree the uses of the various floors. Thus the ground floor, entered at the lower grade, contains stalls for the housing of horses and operating rooms for the larger animals. The ambulatory stable is also located on this floor. The next floor is given over to the lecture room, laboratories, and experimental rooms in addition to a second ward for horses which is reached from the lower floor by a large elevator. The upper floor contains further laboratories and lecture rooms, besides living apartments for the hospital attendants.

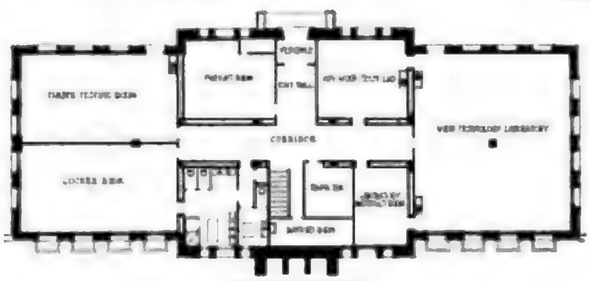
The remaining buildings of the group — including the Headquarters Building, containing the general office, lecture rooms, and laboratories; the Forestry Building, having, in addition to testing rooms and laboratories, a museum; the Poultry Husbandry Building, devoted to the study of raising fowls



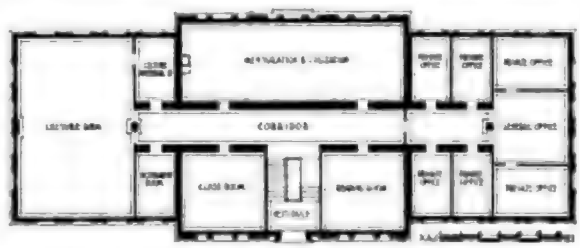
Attic Floor Plan



Second Floor Plan



Basement Floor Plan



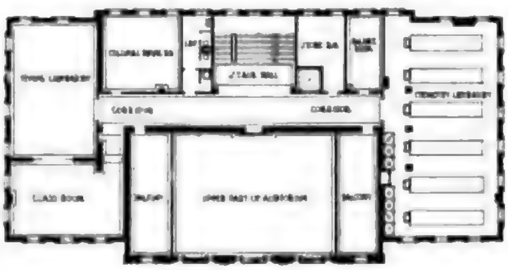
First Floor Plan

Forestry Building, Cornell University, Ithaca, N. Y.

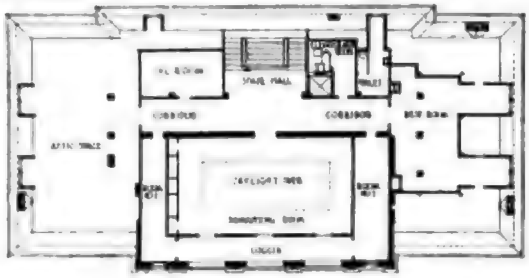
Forestry Building, Cornell University, Ithaca, N. Y.

Green & Wicks, Architects

GENERAL VIEW OF ENTRANCE FRONT

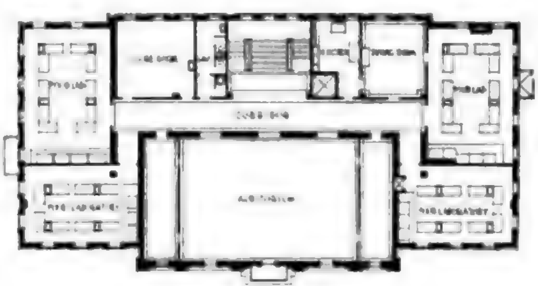


THIRD FLOOR PLAN



ATTIC FLOOR PLAN

FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOME ECONOMICS BUILDING, CORNELL UNIVERSITY, ITHACA, N. Y.

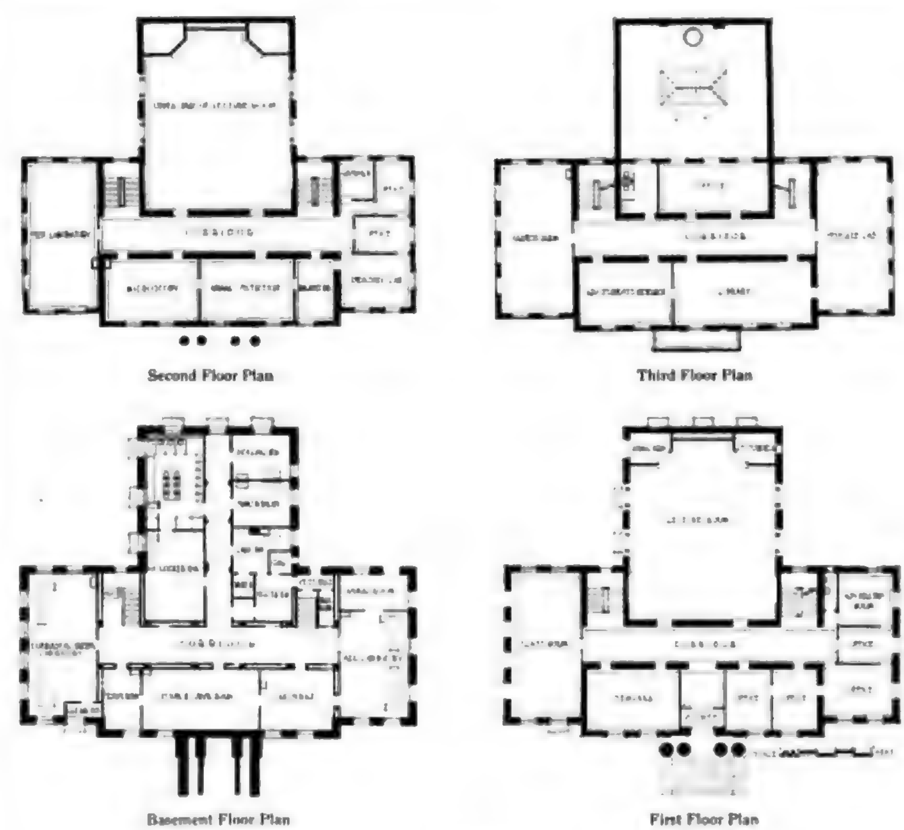
PROFESSORS MARTIN, HEBRARD AND YOUNG, ARCHITECTS. GREEN & WICKS, SUPERVISING ARCHITECTS

Headquarters Building, Cornell University, Ithaca, N. Y.
Green & Wicks, Architects

and preparing them for market; the Agronomy Building, given over to the scientific study of economic value and distribution of land, and the Home Economics Building, in which the study of food is carried on — were designed primarily to provide buildings to house the students engaged in these various sciences in such a manner that study could be carried on with the largest efficiency. In the Home Economics Building the greater portion of the basement is occupied by a large lunch room, adjacent to which is a kitchen and a bakery. There is sufficient accommodation in the lunch room for meeting the demands of the entire body of students connected with the agricultural course. The fact that this portion of the basement is above grade provides good natural lighting by means of large glass areas in the three exterior walls.

All available space in each of the buildings has been utilized, even to the extent of that in the attic stories which, in most of the buildings, have been given over to private laboratories for research work. They are sufficiently lighted by as many dormer windows as could be incorporated without destroying the unity of the façades of the buildings, and, in addition, each laboratory has large skylights.

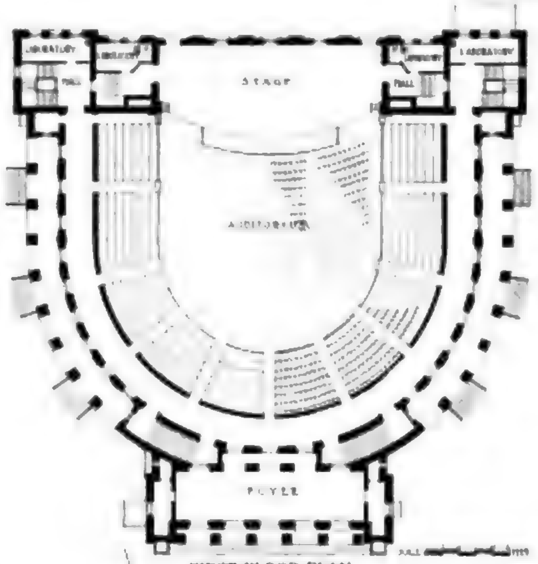
While the buildings are approximately of the same size, and similar in general plan, a good deal of ingenuity has been expended in diversifying the treatment of the façades to make each individual. Though the buildings represent the greatest size and best construction that could be obtained with the appropriation at the disposal of the architects, architectural effectiveness has not been unduly sacrificed, and as a complete group, housing an institution devoted to the study of a utilitarian science, they may be considered a successful solution of a most intricate problem from both architectural and educational standpoints.



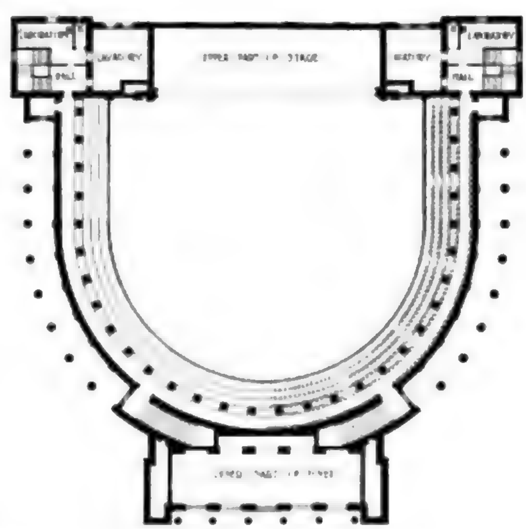
Second Floor Plan — Third Floor Plan — Basement Floor Plan — First Floor Plan

Headquarters Building, Cornell University, Ithaca, N. Y.

ENTRANCE FRONT



FIRST FLOOR PLAN

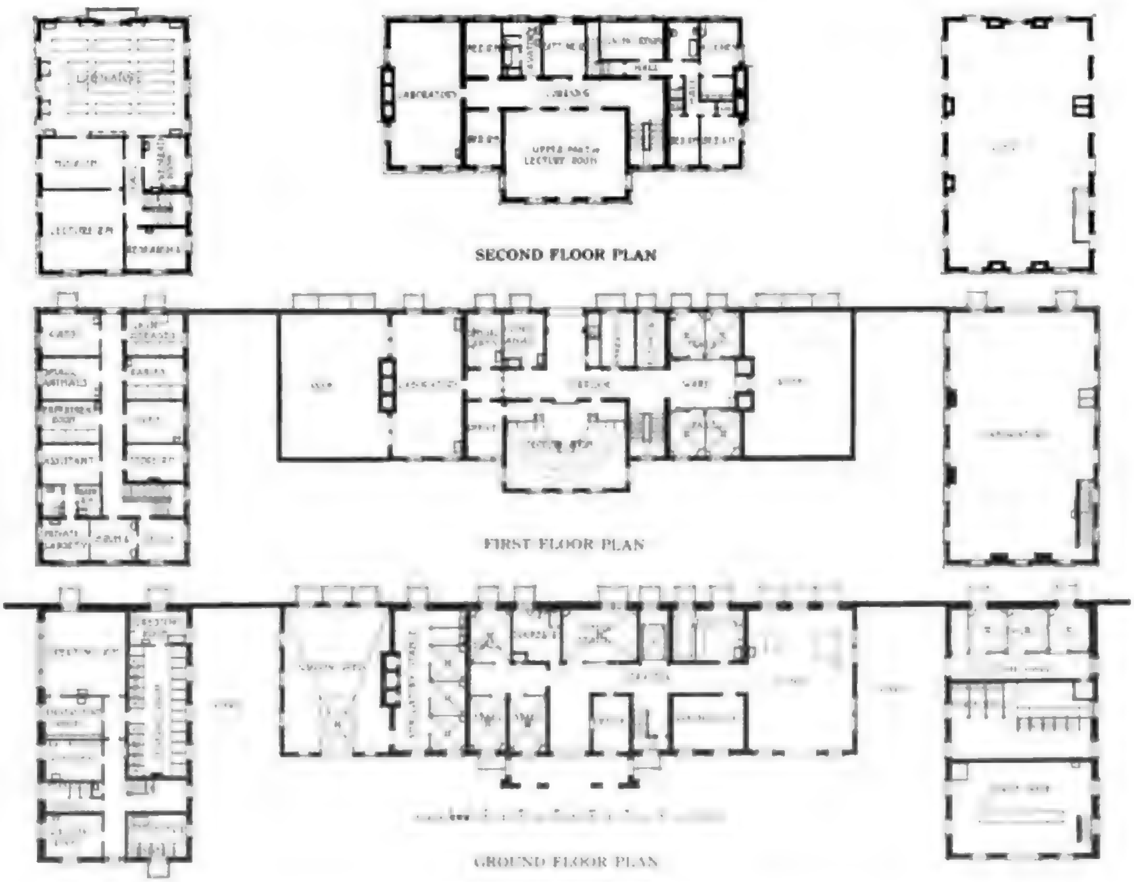


BALCONY FLOOR PLAN

AUDITORIUM AND LABORATORIES BUILDING, CORNELL UNIVERSITY, ITHACA, N. Y.

GREEN & WICKS, ARCHITECTS

GENERAL VIEW FROM UPPER GRADE



SECOND FLOOR PLAN

FIRST FLOOR PLAN

GROUND FLOOR PLAN

CLINIC AND HOSPITAL BUILDING
NEW YORK STATE VETERINARY COLLEGE, CORNELL UNIVERSITY, ITHACA, N. Y.

GREEN & WICKS, ARCHITECTS

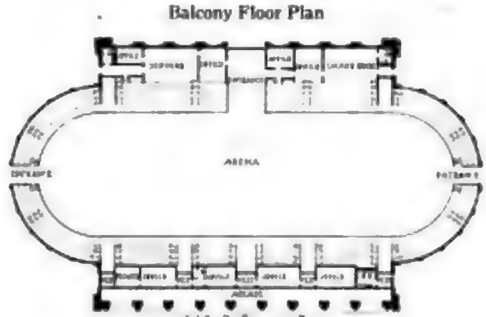
Stock Judging Pavilion at University of Illinois.

W. CARBYS ZIMMERMAN, ARCHITECT.

THIS building was erected at the University of Illinois, Champaign, Ill., for the purpose, as its name implies, of judging and studying stock, and comes within the scope of the Agricultural College.

As the judging of stock carries with it the inspection and observation of animals while in action, it was essential to have a certain distance of travel, and an arena of such shape as to make this travel reasonably continuous. An oval arena would not entirely answer this purpose, as it is necessary, for certain purposes, to have a continuous straight course. This requirement accounts for the rectangular shape of the arena, with the semicircular wings. This plan, incidentally, has proven very desirable, from the view-point of economical administration, because it readily lends itself to the subdivision of space, which permits the use of separate parts of the building for different purposes at the same time. Thus the two semicircular wings are easily cut off from the main body of the arena by curtains, enabling them to be used as class rooms where an animal at rest may be studied close at hand by the students; the rectangular space, at the same time, being in use for the general examination of stock by students and others.

Balcony Floor Plan



Main Floor Plan

The sight lines of a building of this character are, of course, all important, and in determining them great care was taken to be certain that the entire animal, including foot action, would be visible from every seat in the building.

Natural lighting is another essential requirement, and this has been provided for by the use of skylights and large glass surfaces in each end of the building over the semicircular wings and on the sides above the balcony.

The building forms part of a quadrangle on the campus of the University about which are grouped the other buildings devoted to agriculture and allied branches of instruction. A well defined plan for the future development of the University campus has been adopted to insure a homogeneous and well arranged group when all the buildings will have been completed. The plan embraces not only recommendations for the placing of the various contemplated buildings, but also in a general way defines their architectural treatment. This fact was accordingly of much influence in determining the exterior style of the structure.

DETAIL OF ARCADE

GENERAL VIEW OF INTERIOR

STOCK JUDGING PAVILION, UNIVERSITY OF ILLINOIS, CHAMPAIGN, ILL.

W. CARBYS ZIMMERMAN, ARCHITECT

Diagrammatic Progress Schedules.

PART IV. (Concluding Paper.)

By CHARLES A. WHITTEMORE.

WITH the exception of the owner, the architect is probably more vitally interested in the satisfactory progress and consummation of the building than any of the other persons engaged in or employed upon the work. With him begins the development of the conception of the building; on his ability to arrange the plan in a concise, coherent, utilitarian arrangement depends the value of the investment for the owners; and his artistic ability in designing an attractive exterior, interesting interior, and pleasing details not only enhances the value of the building by virtue of its advertising, but also classifies the structure as an adornment to the city in which it is erected. The architect in a large measure is known by his work and gets full credit for all of the good things about the building which the average layman sees, in addition to some slight appreciation on the part of other architects whose discernment is a trifle more keen than that of the average real estate owner or tenant. On the other hand, the architect also gets blamed — and the full measure of blame, sometimes unjustly — for everything in connection with the building which seems to be in the nature of a delay, of an error, an oversight, or of poor workmanship or material. It is unfortunately true that the profession is subjected to more unjust criticism than any other profession possible to call to mind.

The reason for this is also sufficiently obvious, although in presenting the reason the defense of the architect is at the same time presented. Owners and real estate men look to the architect to produce miracles, to do the impossible in the nature of changing entirely the characteristics of contractors, and to work wonders with their pocketbook in the nature of returns on the investment.

The number of times that the architect is called upon to answer the question — what is the architect for? — are legion. Many owners and real estate men think that the architect is engaged primarily to pry from an unwilling contractor value beyond that for which they are paying, to pry from him concessions in payments after contracts are completed, or to worm out of him, by some magical process, workmanship which is beyond the limits of his ability. Why this should be so is a mystery. The same people who would use architects and the architectural profession in such a manner would no more think of conducting other parts of their own business in a similar way than they would think of giving the architect the commendation he deserves after having done the things they desired. Rather than express their appreciation of the way the work has been carried along, they even attempt to pry from the architect a small percentage of his commission in the nature of a concession rather than pay him his commission in full.

Fortunately this is true of a relatively small proportion of the real estate operators, and this percentage is diminishing year by year. The emphasis is laid on this particular phase of the architect's profession in order to more clearly crystallize the idea that it is essential for an architect to be continually on his guard in a systematic manner to prevent causes for criticism on his own part, and also to bring together the various elements in the building construction in so thorough, complete, and harmonious a manner that upon the completion of the building there may be no occasions for embarrassing questions or explanations, and both contractor and owner may feel fully satisfied with the execution of the work.

There is no one agent able to effect this for the architect to a greater degree than a competent office system. From the standpoint of system there are two kinds of architects: one who is so buried beneath a load of so-called system that he has become its servant; the other who operates without any real system whatever except a collection of various mechanical devices which he nominally calls a system, but which are of little or no value to him beyond the nature of filing away memoranda.

It is surprising to find, upon examination, how little actual systematic effort is put forth in connection with many architects' offices. A filing device for letters, a book or card system for bookkeeping, and some sort of a catalogue for drawings and advertisements is the extent of the average office equipment, and so long as it serves its purpose it is quite sufficient. A diagrammatic progress schedule, however, is, and can be demonstrated to be, of such inestimable value that it is difficult to see how architects can satisfactorily conduct their work without something which closely approximates the results of a progress schedule, if a schedule itself is not used.

It would be obviously of no permanent value to any architect to so cumber his office and his work with systematic efforts along various lines that his office force had little time for anything else. On the other hand, it is of great value to have a simple record which can be kept without materially increasing the duties of any one in connection with the office; a record which gives a complete history of every building from the day the contract starts until it is completed; and a record which can readily be filed away for future reference.

Possibly the reason why architects, as a rule, hesitate to adopt anything which seems in the line of business system, is due to the fact that the idea seems to be prevalent that anything in the nature of a systematic business conduct for the office work produces an atmosphere which is not conducive to good imaginative work along artistic lines and makes the office assume the character of a factory where plans are in the process of being ground out. This might readily be true to a certain extent, particularly if time clocks and factory rules of various kinds were introduced and all of the work in the office was conducted along the same lines; but every architect's office can be thoroughly equipped with efficient, systematic devices which do not consume time to operate, but which keep the architect's office records complete and up to the minute.

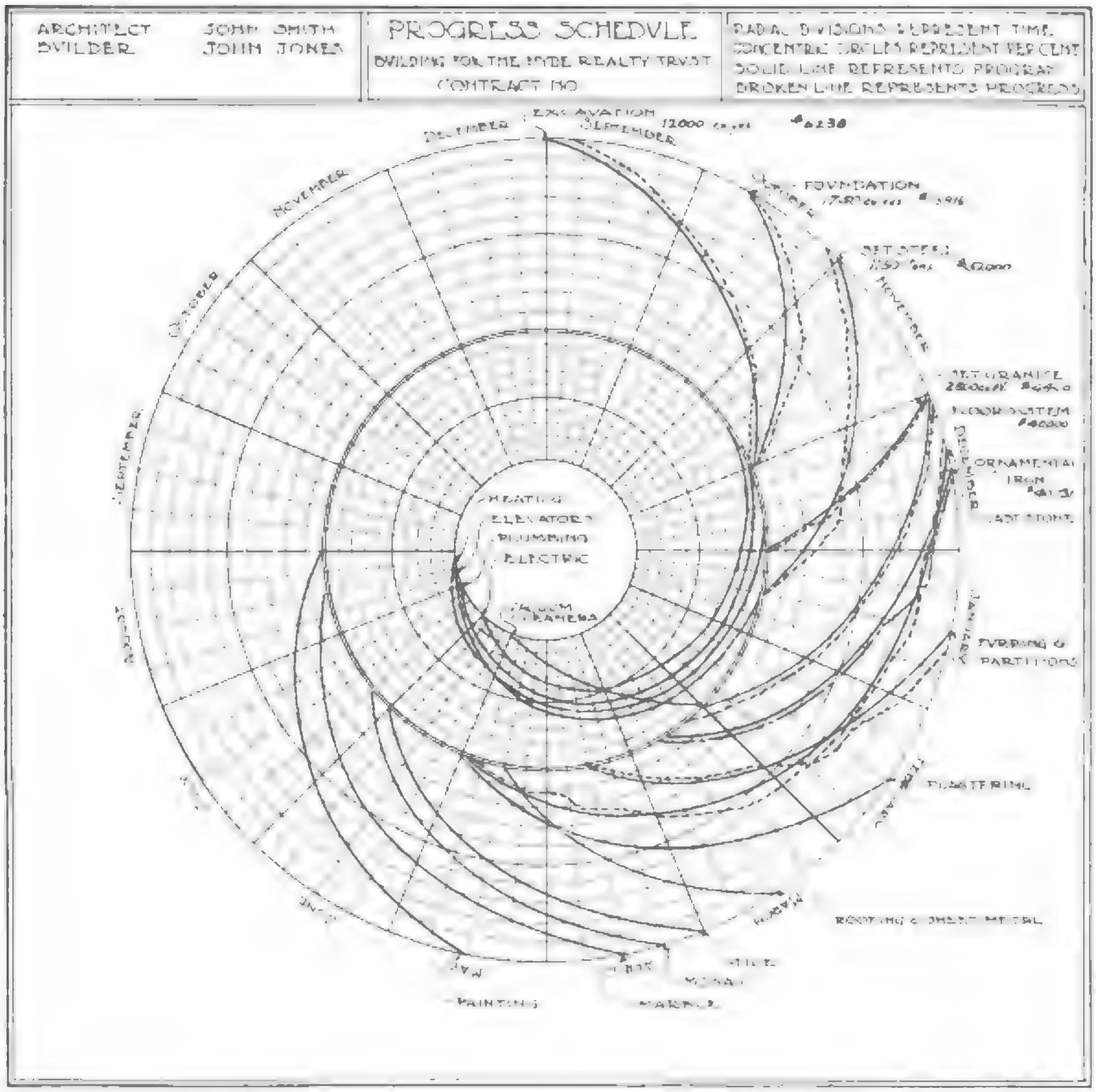
In presenting the diagrammatic progress schedules

which have been illustrated, it has not been the idea that those schedules present the last word in the solution of the problem. The only thought is that those types which have previously been illustrated are types which have been of proven value and are not in the nature of experiments.

The illustration accompanying this article shows a type of progress schedule which in many points is far superior to the other types previously illustrated, and an analysis of the schedule and its operation may bring out some features which might otherwise be overlooked.

In the first place, the form of the program lines being curved is an advantage over the straight lines of the other schedules. When the straight lines are used to indicate the program and also the progress, it is more difficult to detect slight variations between these lines. This is an important fact, as the value of the schedule to check progress depends on the facility with which these variations may be noted. The divergence of the two sets of lines indicates either a tendency toward a future delay or an acceleration in the completion of the particular portion of the contract to which these lines refer. The delay must be corrected at the earliest possible moment, or other parts of the work must be "speeded up" to have the whole contract completed on time. On the other hand, it is important that any acceleration be noted as early as possible so that arrangements may be made for the other portions of the work which are dependent upon or related to the part under consideration.

It is wrong to assume that every contract is either finished "on time" or delayed. It is equally incorrect to assume that once a contract is executed, the possibility of completion before the specified time is remote. Archi-



Type of Progress Schedule Designed to Detect Slight Variations Between Program and Progress

tects and contractors can point with pardonable pride to many cases in which the completed building has been delivered to the owners in advance of the expected completion. This condition is of great value to the owner in that it lessens his carrying charges and increases his income. A recently completed contract illustrates this point. The building in question was to have been delivered to the owners on January 1. By fortuitous circumstances the work was finished sufficiently in advance of this date so that the tenants took possession on the 1st of November. This gave the owners two months' rent on which they had not counted. The progress schedule records such conditions in such a manner that the advanced completion date may be predicted sufficiently early for the owner to make revised dates of occupancy for his tenants.

A comparison of the schedule herewith illustrated, with some of the schedules previously given, will illustrate the difference in the functions of the straight and curved lines which has been described above. It will also present other features by which the merits of the two types may be judged.

The type under consideration here also has the advantage of its predetermined size. In arranging a schedule it is always advisable to provide for unforeseen contingencies which may affect the date of completion, and this can best be done by allowing extra spaces for time to be consumed in case of a delay. It is not extremely difficult to form a reasonably accurate opinion as to the allowance to be made for this contingency. The state of the market, freight conditions, labor requirements, and past record of the contractor all enter into this consideration and, except for such extraordinary events as those that occurred in the fall of 1914, will determine with a fair degree of accuracy the necessary extensions to the contract date. These extensions may not be required, but in a progress schedule of this type they must be provided for in making the divisions.

It is a decided advantage to have all the schedules which are being kept at one time of the same size. This is not alone for convenience in filing, but also for the added simplicity in recording events. Having determined the size of the record sheets, a printed form may be used on which the circles are indicated, the radial divisions being determined for each special case. It would not be impossible to provide two standard forms which would be complete ready for the information pertaining to each contract: one could be arranged with, say, eight radial divisions, and one with fifteen. The majority of contracts would probably fall within these limits, and any contracts for which these would not serve would be treated as special cases.

The schedule illustrated consists of two distinct records, separated by the double heavy line. The outer circles are for the subdivisions of the general contract and the inner set of circles for those contracts which may be awarded independently of the general contractor. The schedule shows the contracts which are usually awarded separately; but the record could be maintained in this same manner even though the contracts were all under the one contractor. In some cases the progress has been noted on the reproduced schedule, in order to show more clearly the working of the device. It would be of a distinct advantage to have the progress and program in different colors. This would make the record more clear in all parts, but more especially in those portions where the contracts are similar in time of commencement and in duration. For example, the "Heating" record of progress could be carried out in blue, the "Plumbing" in red, the "Electric" in green, and these same colors could be used for other divisions where the conflict in line would not be confusing. If colors are used, a line of the same color drawn under the name denoting the division would be of great help in reading the record.

In connection with the name of the subcontracts, as will be noted in the illustration, are two sets of figures: the first refers to the quantities, and the second to the estimated value of these items. This feature is a great aid to the architect's superintendent who checks the monthly requisitions of the contractor. A glance at the progress record shows the proportion of the work completed during the month for which payment is asked and at the same time the proportionate amount due. It also enables the bookkeeper, or whoever issues the certificates for payment, to do all the preliminary work without any consultation except a study of the schedule.

The value of this record in proportioning payments is sufficient in itself to warrant any office in adding the schedule to its system. There are, however, two other conditions under which this record may prove to be almost indispensable. In the first place, the schedule affords the architect a comparison between buildings erected, buildings in process of construction, and projected buildings. In making a preliminary estimate for an owner the architect need only refer to a completed record and a "going" record of a similar structure to be able to give a very close estimate of the probable cost. He can also check the cube price as well as the quantity price of any particular part of the contract.

If the approximate cost of buildings could be based upon information as accurate as that supplied by the schedules used in this manner, the average owner would undoubtedly be obliged to change his opinion of the architect's estimates. Who has not heard an owner say, "That is the architect's estimate; you must add ten per cent to that," or words to that effect?

A second condition which proves the value of the progress schedule is found when a contractor is compelled to relinquish his contract and have the work completed by another. This occasion does not frequently arise, but having arisen may be a source of embarrassment to the architect who is not prepared for it. It will be obvious upon examination of the schedule that the architect and owner have in their hands the contractor's own estimate of the value of the contracts under his control at any time during the construction period. If the schedules are signed monthly by the contractor, or if he accepts his payments as based on the schedule record of work done, the opportunity for disagreement as to an equitable settlement, in case another contractor is called in to complete the work, is minimized. It will also be noted that the requisitions as based on the schedule always automatically reserve the estimated cost to complete the work from that date.

It would be possible to further analyze the value of these schedules and to point out other phases which might be of great assistance to the users. Each one who adopts a

record of this kind can readily develop features which may meet his particular requirements to better advantage than some of those already noted, and it is in just such a manner that a device can best prove its worth. Some might find that an entirely different form or arrangement would be more suitable to their needs. The underlying principle would, however, be alike in all cases and the value would be present whatever the method of keeping the record might be. The types illustrated have already been in use and have demonstrated that they represent a more compact and simplified form of report than those which they have superseded.

If the architect and the contractor agree upon keeping a progress schedule, they will both find it a great convenience to have the contractor send a blueprint of his schedule to the architect at the same time that he sends in the monthly requisition. The architect then may consult his record and any differences may be then adjusted. This saves future settlements of questions which are best settled when the events are fresh in each mind. The architect in sending the owner the certificate for payment, sends also a copy of his progress schedule. The owner can readily follow the progress of the work and know that each copy of the record as presented to him has been certified by both contractor and architect. He may thus be entirely free from the anxiety caused by lack of accord between the contractor and architect and feel that the contract is being executed properly and that his interests are properly safeguarded.

In cases where this progress schedule has been maintained and reports made to the owner as indicated above, the owners have found it to be of great assistance. In comparison with the method usually maintained by architects in keeping records of the progress of their work, the progress schedule stands very high, and any architect who maintains one, would find this to be a fact upon trial.

A great many of the architects' offices confine themselves in the nature of progress reports to a report which embraces weather conditions, number of men on the work, the character of the progress of the work — whether the work is being pushed rapidly or going along slowly. These reports are sometimes rendered daily and sometimes weekly. Where a progress report is made, however, the superintendent, after daily or regular visits to the building, dictates his reports on the condition of the building as outlined above and then every week, or more often, if desired, carries out the progress of the building on this schedule. This requires but very little additional time and is well worth the extra effort.

Those in connection with the office who do not regularly visit the building can, by reference to this progress schedule, familiarize themselves much better with the actual status of the work than from a perusal of the written reports, and this fact has already been demonstrated by the use of the schedules.

There is one phase of an architect's work to which the progress schedule is of great value which has not been presented for consideration, and that is when work is being done under the architect's direct supervision at a considerable distance from his home office.

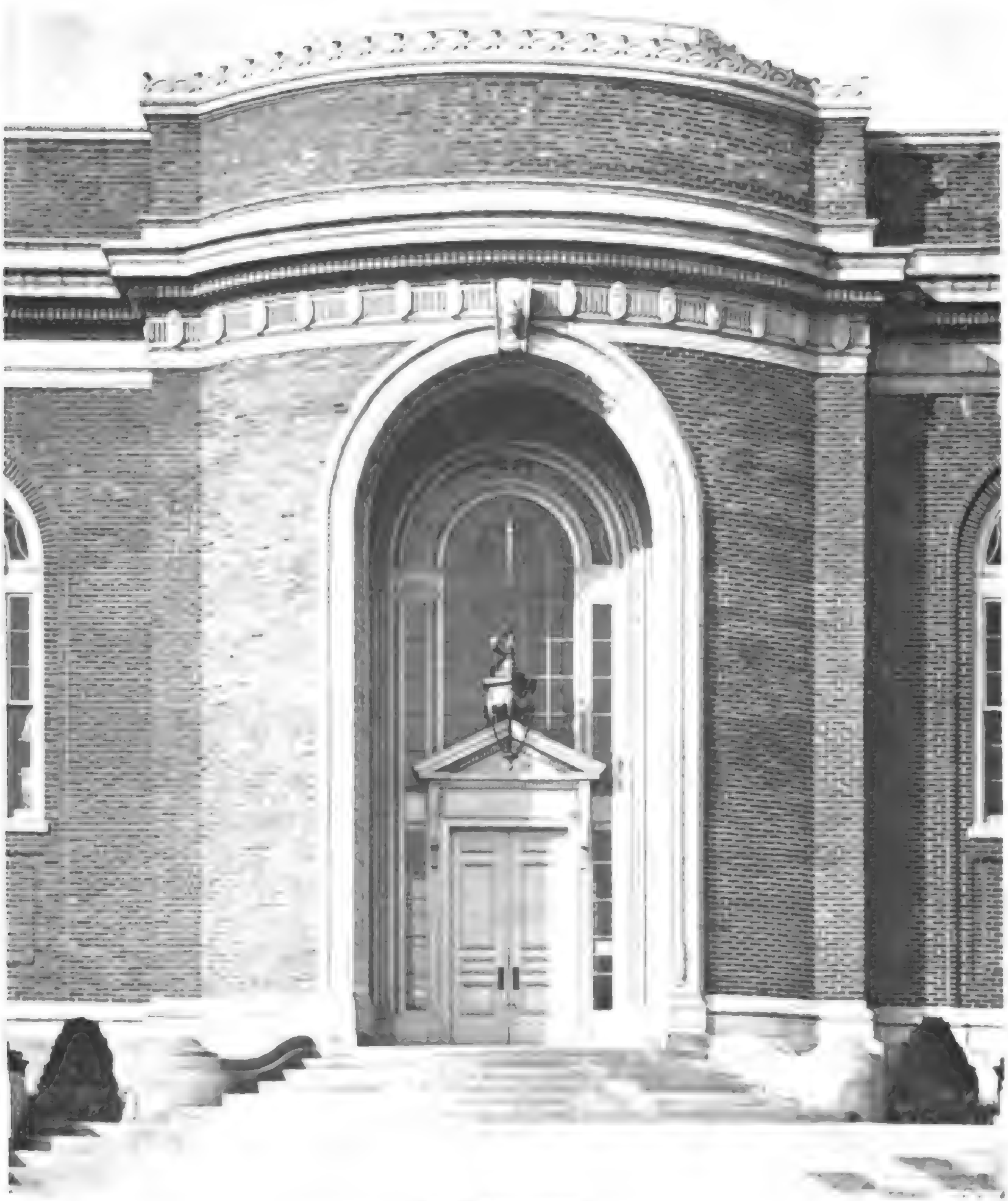
Many architects under these conditions prefer to have a local representative either from their own office, who makes his home temporarily in the city in which the work is being done, having complete charge of the work, or in the person of a local architect of reputable standing to whom a commission is paid for his superintendence. In either case it is obvious that the principal difficulty of the architect is in keeping himself thoroughly informed as to just what is going on at the building in his absence. His own personal visits to the building obviously cannot be as frequent as if the work were close at hand and in order; therefore, to satisfy himself as to just exactly what is being done, he must depend on some form of report from his local representative. In cases where the progress schedule is not employed, this becomes either a letter or a report similar to the reports made by the daily visits.

A progress report, however, would mean more and would present more facts regarding the actual condition of the building to the architect than any other form of report which can be maintained at so little expense and trouble. The architect may be interested in questions of contract and questions of interpretation of drawings and in questions of instructions to the various contractors, but these in the majority of cases can be handled perfectly well by the local representative. The architect, however, is vitally interested in the records of the respective parts of the work and can feel as thoroughly conversant with the conditions of the building after having reviewed his progress schedule as though his own personal visits were made far more frequently. In addition to this he can lay out the specific points of the work which he cares more particularly about informing himself, at his next visit, by a consultation with the progress schedule.

The objection undoubtedly has already occurred to those who have considered the progress schedule but have not adopted it; that it would be difficult to arrange with the contractors and the sub-contractors to adopt a system of this kind. This is true to a certain extent and still it would be surprising to those who have never investigated it, to find how many of the better class of contractors at the present time are maintaining a progress schedule of their own without reference to the reporting of the progress to the architect.

It was as difficult to get contractors to use concrete mixing machines when they were first placed upon the market; it was as difficult to have the contractors intelligently use steel construction when this first became a feature of modern buildings; and it was as difficult to have contractors adopt any method different from that which they have become accustomed to through use and tradition as it would be to have them adopt this progress schedule, and probably the difficulties would be no greater. Certainly the value which the contractor would place upon the progress schedule after a sufficient use of this system for him to become thoroughly familiar with its advantages would be as great an aid to modern building as some of the different types of construction which are now used, have been over those previously employed.

In previous articles the value of the progress schedule has been noted as applied to the use of the contractor, to the use of the sub-contractor, and for the benefit of the owner. It seems obvious to those who have used this schedule that it is of even greater value to the architects than to the others who are interested in the building, and undoubtedly a further use of the progress schedule will develop benefits which as yet have not been discovered.



DETAIL OF ENTRANCE

HADDINGTON BRANCH, THE FREE LIBRARY OF PHILADELPHIA, PHILADELPHIA, PA.

ALBERT KELSEY, ARCHITECT

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FRONT ELEVATION

INTERIOR LOOKING TOWARD CHILDREN'S ROOM

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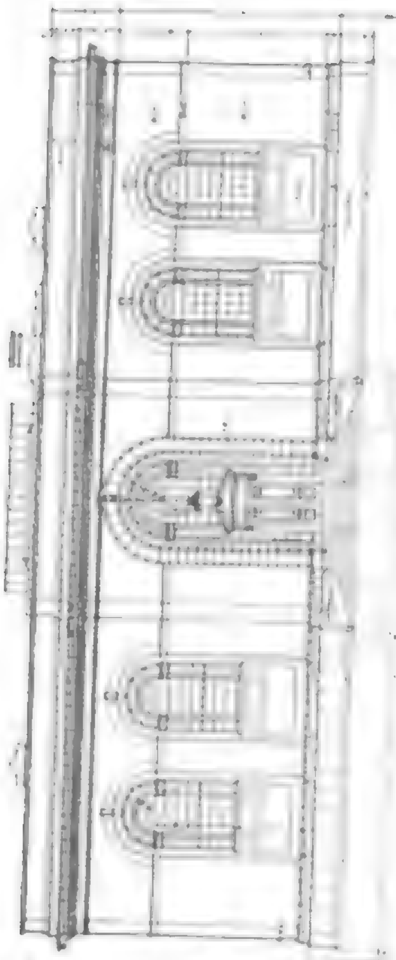
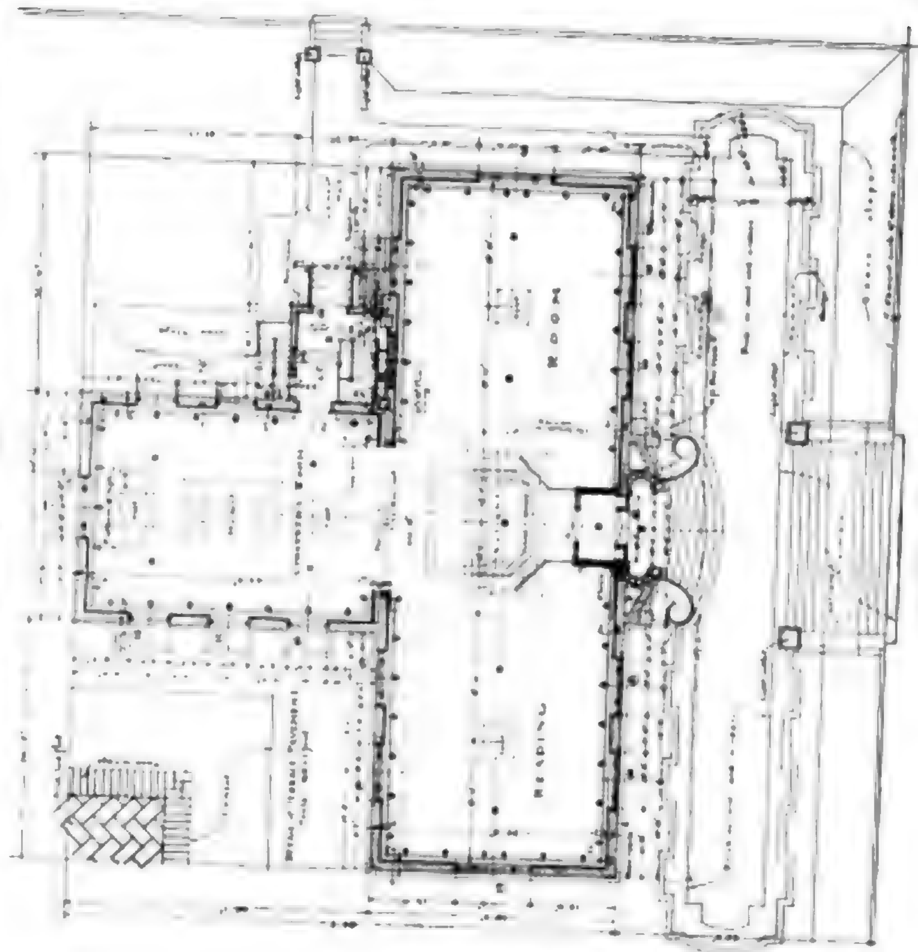
ALBERT KELSEY, ARCHITECT



FRONT ELEVATION



MAIN FLOOR PLAN

VIEW ALONG TERRACE

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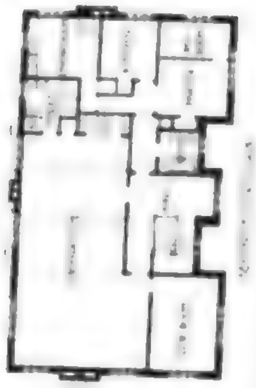
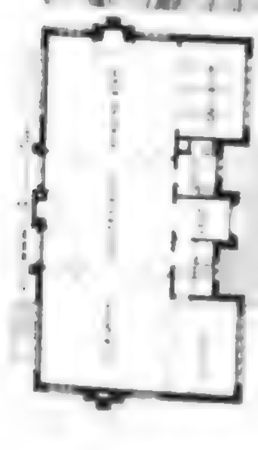
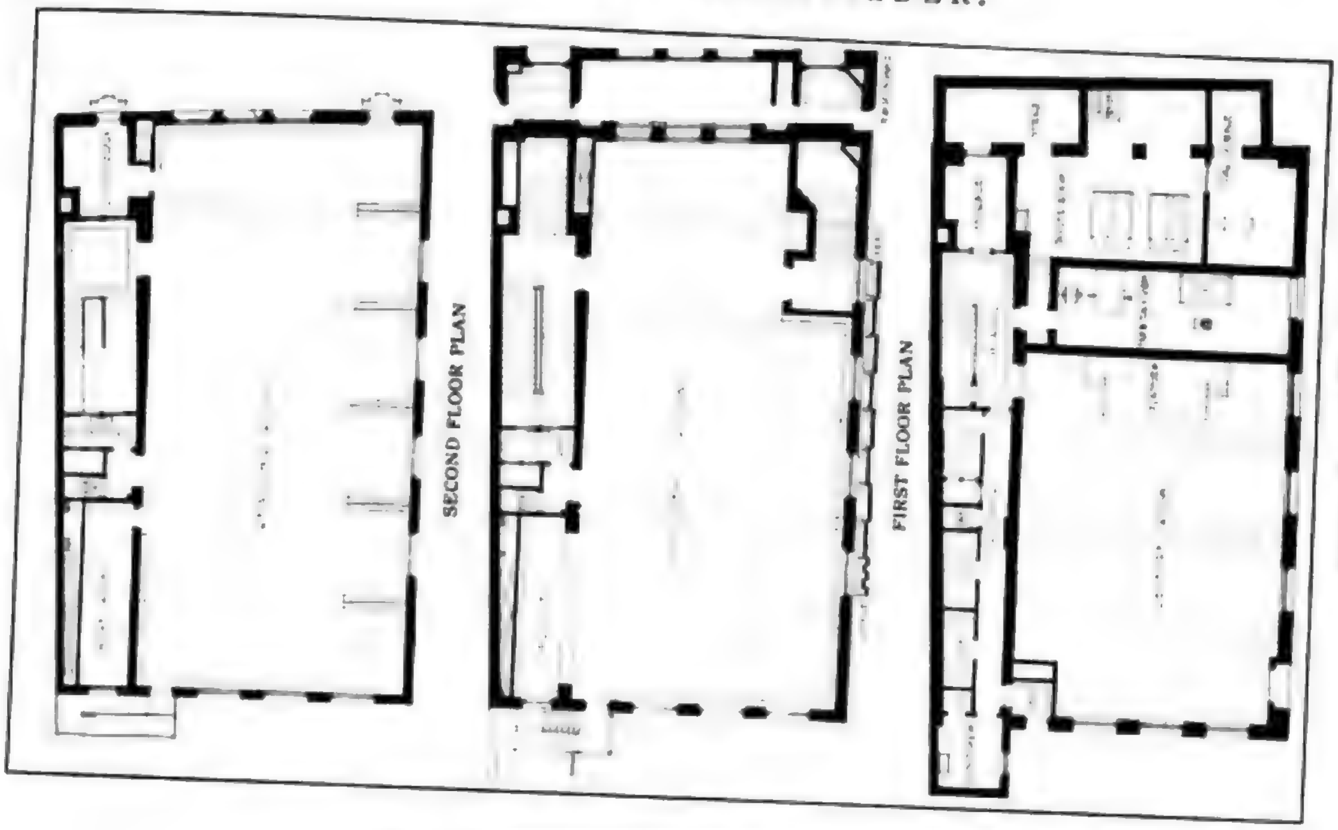
ALBERT KELSEY, ARCHITECT





EMANUEL EINSTEIN MEMORIAL, POMPTON LAKES, N. J.
SLEE & BRYSON, ARCHITECTS



GENERAL VIEW

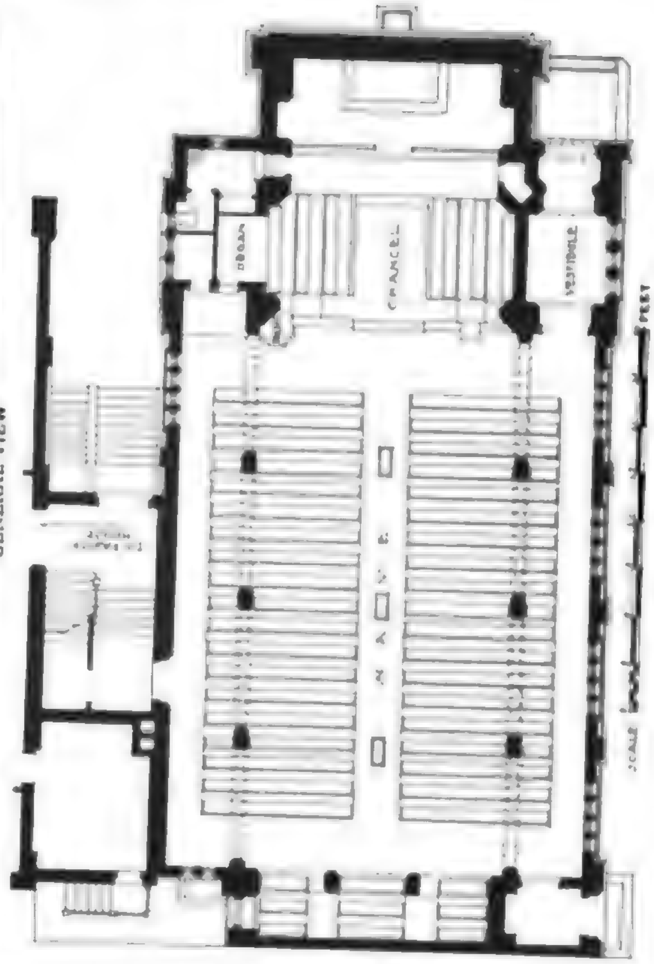
CHARLESTOWN BRANCH, BOSTON PUBLIC LIBRARY, CHARLESTOWN, MASS.

FOX & GALE, ARCHITECTS

DETAIL OF CHANCEL END OF CHAPEL

CHAPEL OF ST. SIMON THE CYRENIAN, PHILADELPHIA, PA.
WALTER H. THOMAS, ARCHITECT

GENERAL VIEW



MAIN FLOOR PLAN

INTERIOR LOOKING TOWARD CHANCEL

CHAPEL OF ST. SIMON THE CYRENIAN, PHILADELPHIA, PA.
WALTER H. THOMAS, ARCHITECT

GENERAL VIEW

DETAIL OF WINDOW

INTERIOR LOOKING TOWARD PULPIT PLATFORM

THE ST. ANDREW METHODIST EPISCOPAL CHURCH, PHILADELPHIA, PA.

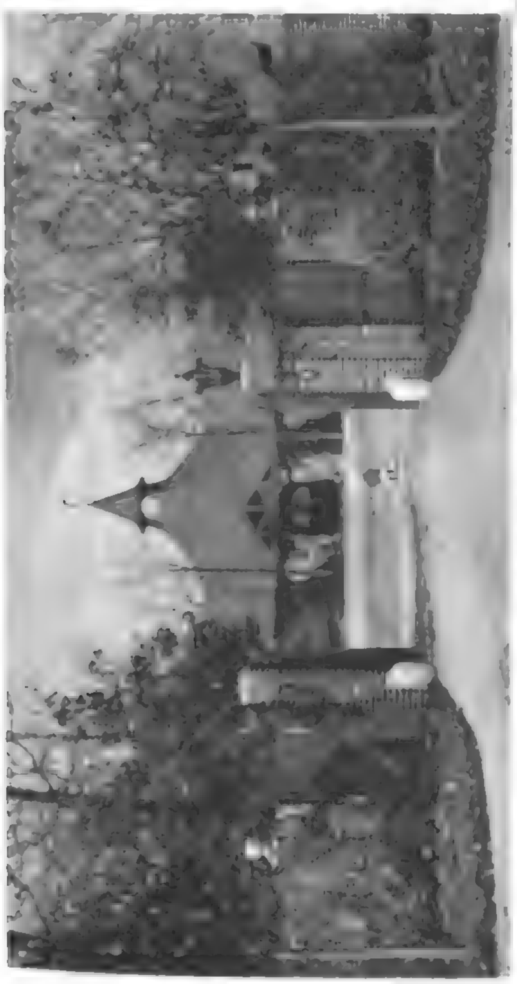
C. E. SCHERMERHORN, ARCHITECT

DETAIL SHOWING ENTRANCE TO GARAGE

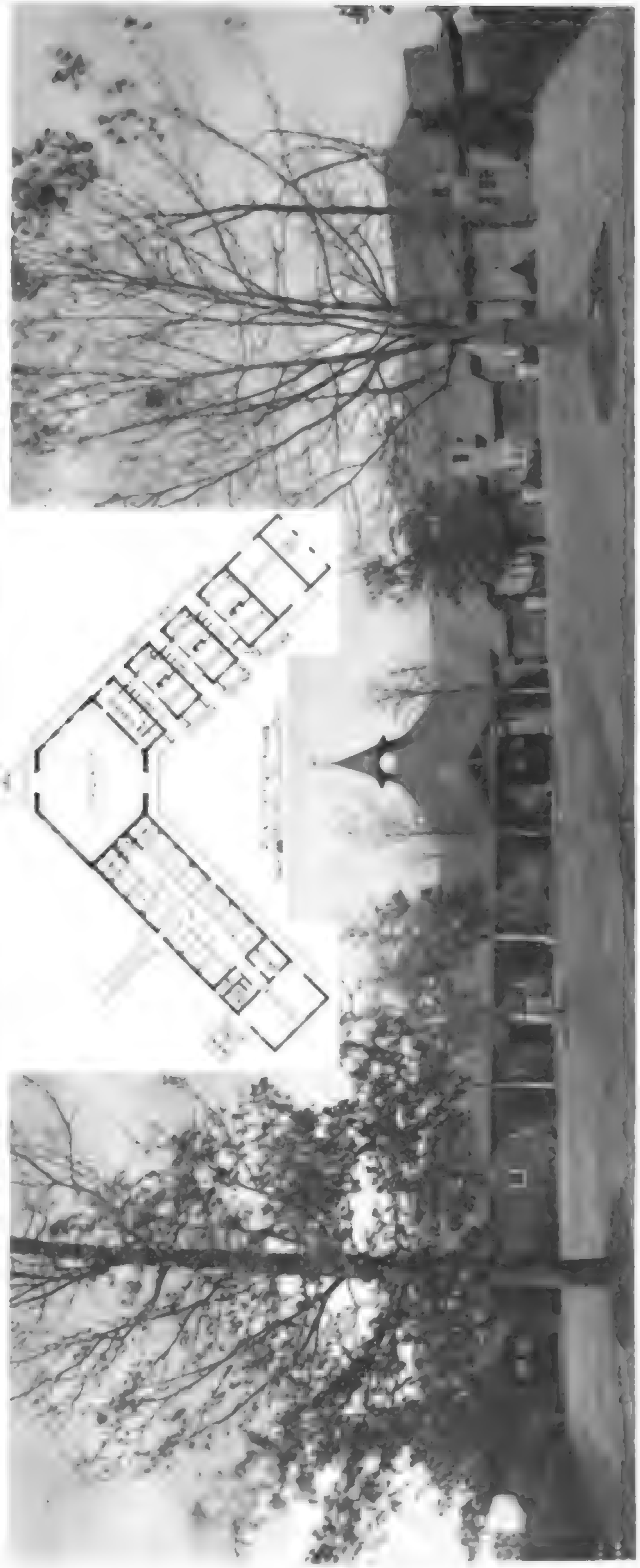
STABLE AND GARAGE OF W. D. STRAIGHT, ESQ., WESTBURY, LONG ISLAND, N. Y.

DELANO & ALDRICH, ARCHITECTS

VIEW OF CENTRAL PORTION



VIEW OF ENTRANCE



GENERAL VIEW FROM ENTRANCE GATES

STABLE AND GARAGE OF W. D. STRAIGHT, ESQ., WESTBURY, LONG ISLAND, N. Y.

DELANO & ALDRICH, ARCHITECTS

HOUSE OF MRS. J. G. THORP, CAMBRIDGE, MASS.
A. W. LONGFELLOW, ARCHITECT

VIEW OF REAR

FIRST FLOOR PLAN

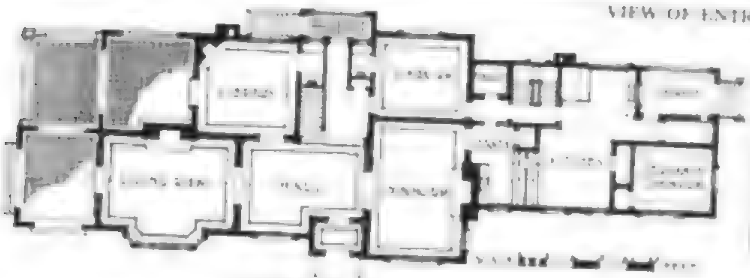
SECOND FLOOR PLAN

DETAIL OF ENTRANCE

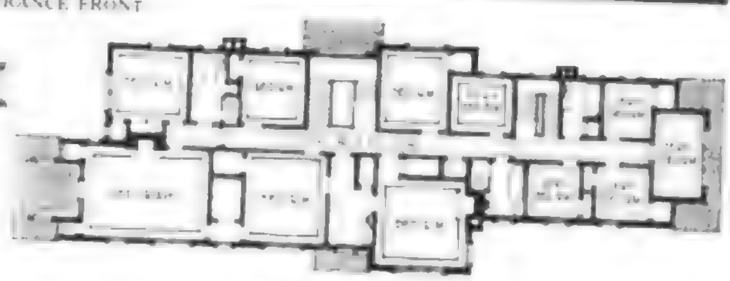
HOUSE OF MRS. J. G. THORP, CAMBRIDGE, MASS.

A. W. LONGFELLOW, ARCHITECT

VIEW OF ENTRANCE FRONT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

VIEW OF REAR

HOUSE AT RADNOR, PA.

BISSELL & SINKLER, ARCHITECTS

VIEW FROM GARDEN

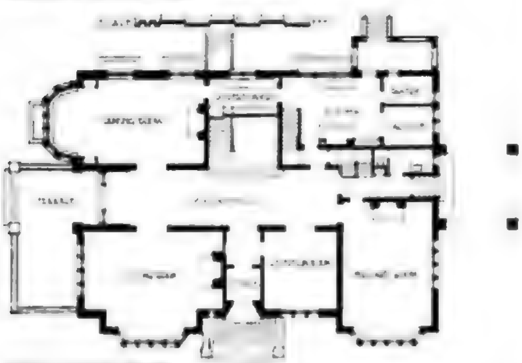
VIEW FROM STREET

HOUSE OF JOHN JACOBS, ESQ., MERION, PA.

D. KNICKERBACKER BOYD, ARCHITECT

GENERAL VIEW FROM STREET

SECOND FLOOR PLAN



FIRST FLOOR PLAN

DETAIL OF DOORWAY

HOUSE OF JAMES COUZENS, ESQ., DETROIT, MICH.

ALBERT KAHN, ARCHITECT; ERNEST WILBY, ASSOCIATE

GENERAL VIEW FROM STREET

HOUSE OF HUDSON MOORE, ESQ., ATLANTA, GA.

W. T. DOWNING, ARCHITECT

THE BRICKBVILDER COLLECTION OF

EARLY AMERICAN ARCHITECTURAL DETAILS.

PLATE NINETEEN.

THE date of this stately doorway of wood is unknown, but it is probably early nineteenth century work. It is of an entirely different character from the other early work in Alexandria, resembling more the formal classic type in vogue at that time. The exact proportions of the order and its pediment, the studied and pleasing contour of the mouldings, and the architrave framing the opening are worthy of note. The house was originally a hotel or tavern.

DOORWAY OF HOUSE ON PRINCE AND ST. ASAPH STREETS, ALEXANDRIA, VA.

MEASURED DRAWING ON FOLLOWING PAGE.

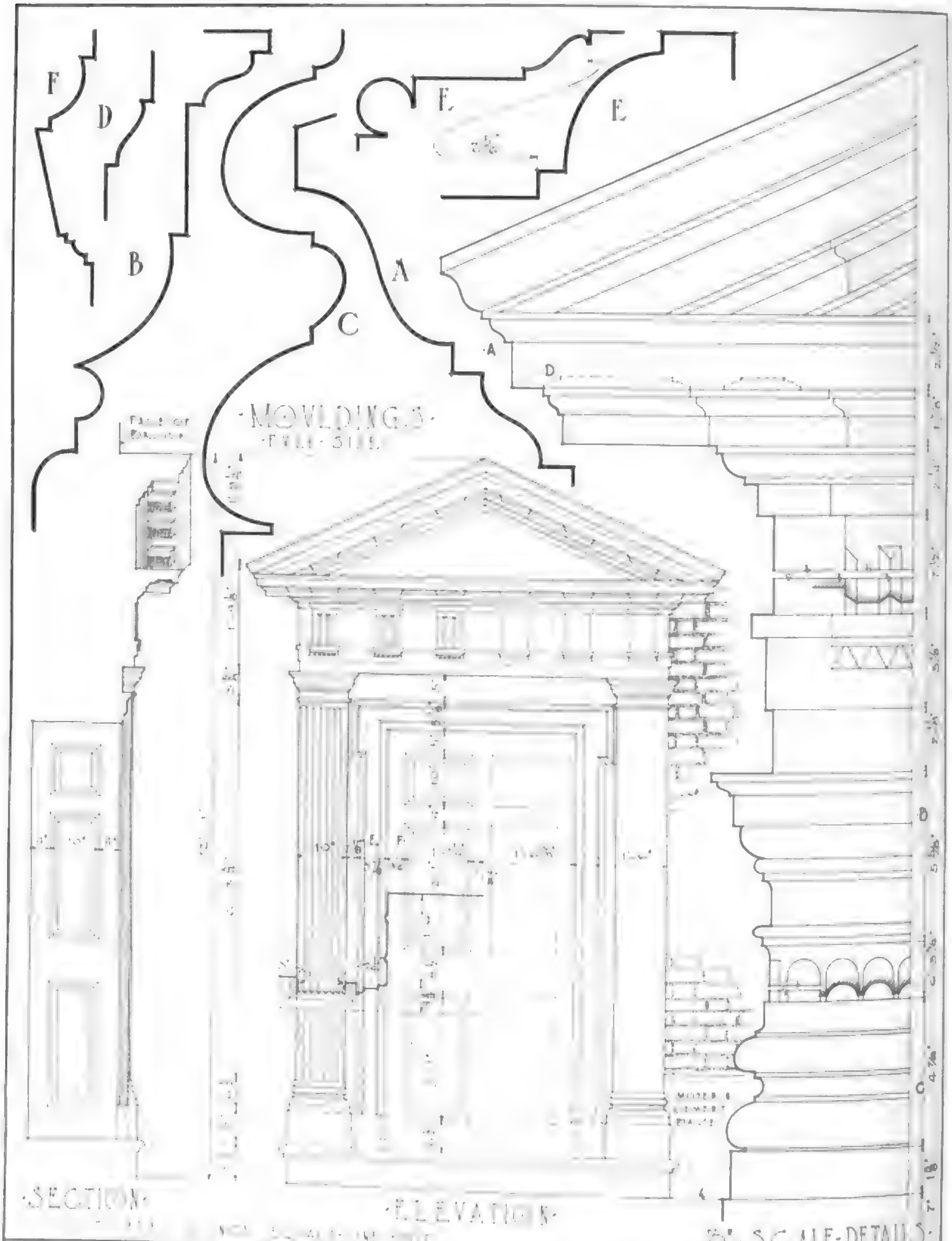


PLATE 19
APRIL 1916

·ALEXANDRIA·HOVSE·
·ALEXANDRIA·VA·
·DATE·VNKNOWN·
ARCHT·VNKNOWN·

MEASVRED·&·DRAWN·BY·
·J·L·KELSTER·O·J·
·MVNSON·&·J·A·WEBER·

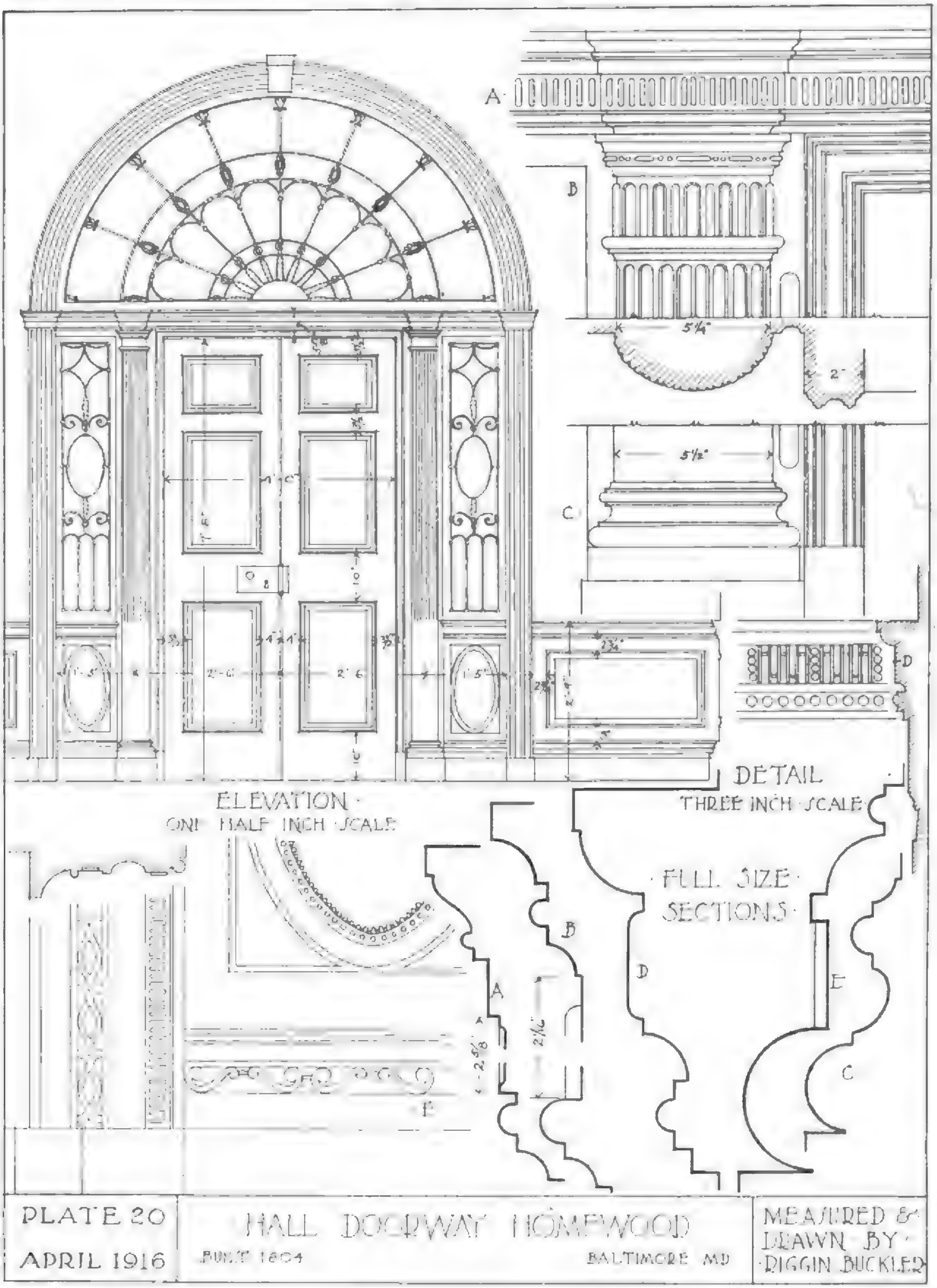

A
B
C
D
E
F
ELEVATION
ONE HALF INCH SCALE
DETAIL
THREE INCH SCALE
FULL SIZE
SECTIONS
PLATE 20
APRIL 1916
HALL DOORWAY HOMEWOOD
BUILT 1804
BALTIMORE MD
MEASURED &
DRAWN BY
DIGGIN BUCKLER

PLATE TWENTY.

INTERIOR doors of this character are uncommon and are a pleasing variation from the conventional hallway arch. A long narrow hall runs the length of the building, and where it crosses the entrance hall the ceiling is vaulted. This doorway leads to the front hall and an arch of similar design to the rear. The detail is very delicate and all the mouldings are enriched with carved ornament. Softened by time, the effect of this enrichment is very pleasing. The leaded fan and side lights are particularly good examples of their kind.

HALL DOORWAY, HOMEWOOD, BALTIMORE, MD.

Built in 1804

MEASURED DRAWING ON PRECEDING PAGE.

The School Power Plant.

By HAROLD L. ALT.

THE subject of a school power plant is one most interesting to the taxpayer and the school board, and for these reasons also to the architect. Even where a power plant is not to be considered there are many cases where provision by the architect for a possible future power plant gives the school board a sufficient advantage over the local lighting company to obtain substantial reductions in rates even if a plant is never actually installed. On the other hand, in some instances, the local service company is supplying current at an entirely fair and equitable rate so that its use by the school under this circumstance is much better judgment than the installation of a separate plant.

As a general proposition a power plant in a building will show the greatest saving: first, where the building is used twenty-four hours per day; second, where the power and light requirements are heavy and continuous; third, where the rates for outside current are high; and fourth, where the power can be produced on the premises without excessive expense or discomfort.

It is interesting to note that the general idea of installing a plant for the purpose of producing light and power and then, as an afterthought, utilizing the exhaust steam in the heating system is entirely a wrong perspective. With a power plant or without, the building must be heated and, if laundry or steam cooking is done, steam will be required at 40 to 60 pounds pressure; while even without these additions the steam for the heating system must be supplied at a pressure between atmosphere and 5 pounds. In any way the building may be arranged, steam will be required. Since it is necessary to have steam, why not obtain its full valuation? Experiment and actual test show the surprising fact that with steam at 100 pounds pressure there is but little practical difference whether it is let into the heating system by being expanded through a reducing valve or whether it is expanded behind the piston of an engine and then enters the heating system after passing through a grease extractor to separate the oil. In fact, the additional amount of steam required for the engine operation is only some four per cent!

In exchange for this four per cent the engine will light the building — all day long if desired, run every motor and supply all the other power needs with no need of additional coal, as long as heat is kept up in the building. On this point a school has a great advantage over every other class of building, as it is almost entirely operated during the season when heat is required and is closed for a large part of the summer. Thus, while a school may be charged a minimum rate for the summer months by the service company (this charge often being $50 to $60 per month), with its own plant all expense ceases as soon as the building is closed.

As a general statement, every building uses steam enough in heating to more than supply any ordinary power and lighting load. In fact, a make-up connection is always installed between the high pressure steam main and the heating system steam main so that *additional* steam (over and above that used by the engines) can be obtained through a reducing valve.

The main point of loss in the isolated plant is the coal required to be burned on warm days to keep up steam where otherwise the fires could be banked, but there is always some demand for hot water, and, where cooking or laundry needs are to be satisfied, this loss becomes practically nil.

Night school also makes a big difference in the amount of current used for lights, this current generally being charged for at a higher rate than current used for motors or power.

To determine accurately the saving, if any, by the installation of a plant in a school, a careful study of the individual conditions must be made in each case — probable hours of operation, amount of power used, future extensions and a multitude of other things are considerations. Accurate information on these points is often unattainable, and in its stead wild guesses are substituted, the errors in which are shown when accurate data is received.

Since practical examples are always more interesting and generally far more easily understood than a miscellaneous group of generalities with no definite and concrete application, let us consider a typical instance where a school of the older type contemplated the installation of a plant. This case is offered here because the school was right on the border line between a "plant" and "no plant" and also because some very exact information (later obtained) showed that this plant would not be profitable; yet when figured on the basis of the janitor's estimates (evolved from his guess as to the number of hours operated and horse power of apparatus run) figures were produced indicating a power consumption of between *four* and *five* times the amount actually used, the true amount being later determined by the discovery of the bills showing the electric meter readings month by month for the year previous.

This error in the janitor's estimate would have cost the school board some $450 a year had they decided to put in a plant on the basis of the consumption that the janitor claimed.

The conditions under which the building was operating as far as they were obtainable from bills and other data are as follows:

The school was burning 450 tons of coal per year to heat the building at $4.50 per ton, or $2,025 per year.

Total motor horse power for some 26 motors was 130 H. P., or about 97 Kw.

Total lights equaled the equivalent of 1,000 — 60 watt tungsten lamps, or 60 Kw.

The total current consumption month by month consisted of the quantities as given in the table on the following page.

	Light. Kw. Hours.	Light. Cost.	Power. Kw. Hours.	Power. Cost.
Jan.	900	$86.00	4370	$192.00
Feb.	680	66.00	5260	210.00
March	730	80.00	4218	190.00
April	670	65.00	3088	166.00
May	620	61.00	2728	160.00
June	600	59.00		58.00 (a)
July	400	40.00		58.00 (a)
Aug.	270	27.00		58.00 (a)
Sept.	440	44.00		58.00 (a)
Oct.	621	51.00	4498	195.00
Nov.	740	72.00	5788	220.00
Dec.	1113	104.00	5178	208.00
	7784	$755.00	35128	$1773.00
Av. rate per hour,		.097	Av. rate per hour,	.05

(a) Indicates minimum rate charge per month.

Total light bill	$755.00
Total power bill	1,773.00
Total electric bill	$2,528.00
Total light Kw. H.	7784
Total power Kw. H.	35128
Total electric Kw. H.	42912

(The janitor's estimate was 166,100 Kw. H., or four times as much as actual.)

To all intents this building appears to be one in which a power plant would effect a considerable saving, yet when carefully analyzed it was proved conclusively that the school was being operated at least as cheaply, if not more cheaply, through the use of outside current as it would be with its own plant. This is owing to a large extent to the fact that a low pressure boiler plant was installed, which would require excessive expense to tear out and remodel into a high pressure plant, and the fact that the building was not complete, thereby requiring the installation of units *now* whose full capacity would not be required until the future building program had been completed.

Added to this was the fact that there was, in this particular case, no night school to be considered and a load, generally averaging much below the maximum, which could, however, be thrown on entirely at one time during certain intervals.

A careful estimate made of the cost and operating expense for a power plant in this building is most instructive. The total connected load (allowing for ordinary electrical losses) was 130 motor horse power, or

About	110 Kw. for power and
About	60 Kw. for light
or	170 Kw., total

The school board contemplated certain changes in the courses, involving additional power requirements of some 50 Kw. This increased the load to 220 Kw., to which had to be added an allowance of 30 Kw. to cover an addition to the building under consideration for the near future. This resulted in a total future load of 250 Kw.

It was decided that it would be necessary to install two 125 kilo-volt-ampere alternators driven by steam engines so that one would carry the load at normal times and two could be used at periods when the whole building, including gymnasium, auditorium, etc., might be in use. Two units were desirable so that in case of breakdown the necessary portion of the school could be run on one unit. Without duplicate units, breakdown service must be obtained from the local service company, and it is usually only to be had at such exorbitant rates as to make the operation of a private plant unprofitable, which is the very reason that the rates are made excessive.

The cost to install a plant of 250 Kw. capacity laid out as indicated in Fig. 1, which shows the installation contemplated in this instance, would require expenditures as follows:

Two 125 K. V. A. alternators and exciters	$3,560.00
Freight and mounting on engine shaft	400.00
Switchboard and voltage regulator	800.00
Recording watt meters	200.00
Two engines erected complete	4,000.00
Foundations	500.00
Electric wiring	750.00
Additional partition to form engine room	200.00
Tearing up and replacing floors	150.00
Steam piping, pumps, feed water, heater, and accessories	5,500.00
Engineering fee	800.00
	$16,860.00

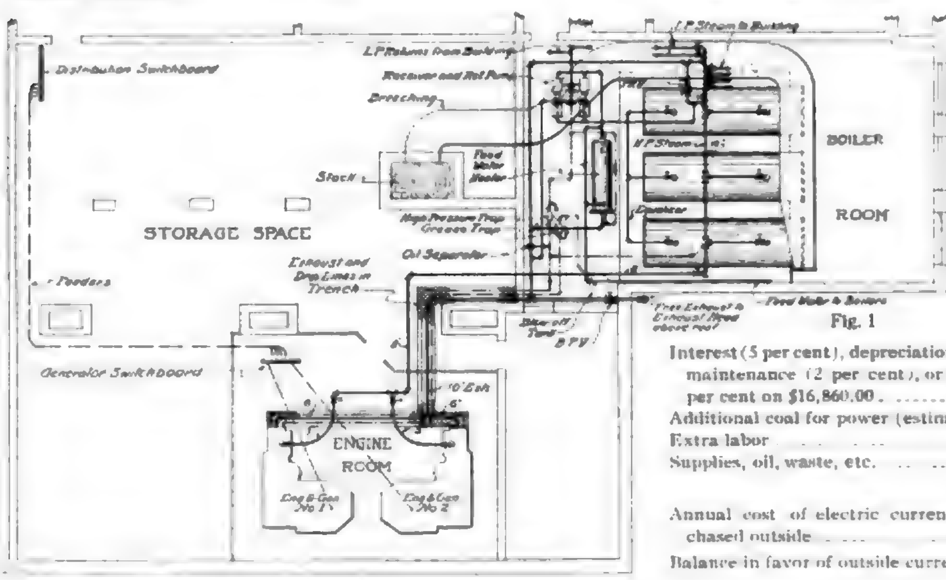


Fig. 1

This gives the total additional investment required for the power plant from which interest and depreciation can be figured to obtain the annual operating cost. This is as follows:

Interest (5 per cent), depreciation (5 per cent), maintenance (2 per cent), or a total of 12 per cent on $16,860.00	$2,023.00
Additional coal for power (estimated)	450.00
Extra labor	400.00
Supplies, oil, waste, etc.	100.00
	$2,973.00
Annual cost of electric current when purchased outside	2,528.00
Balance in favor of outside current	$445.00

It must be remembered, however, that *this* was a comparison between power consumption *at present* as compared with the cost of operating a power plant big enough for all the future needs. It has been seen that the existing consumption consists of

7,784 Kw. H. for lamps
35,128 Kw. H. for power

and that the total connected load for power is some 110 Kw.; but what happens when the increased demand for current contemplated by the board takes place? The connected load increases from 170 Kw. to 220 Kw., or about 30 per cent, and the current consumption will jump at about the same rate. Then instead of 35,128 Kw. H. per year for power, there will be used

35,128 x 1.30 = 45,660 Kw. H.,

which at the average rate of .05 per Kw. H. (cost from public service company) makes the

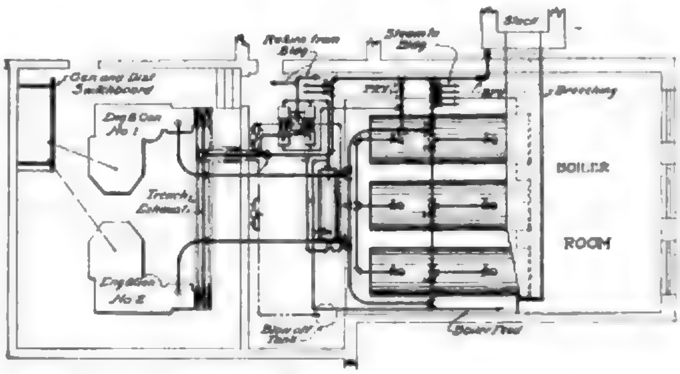


Fig. 2

Power bill	$2,283.00
Light bill	755.00
Total power cost	$3,038.00
Against this is operation cost of plant	2,973.00
or a saving of	$65.00
Consumption of coal will also be increased 30 per cent, or	135.00
Net saving, or balance in favor of outside current	$70.00

This shows a plant which operated at a loss would come up to about an *even* break with the increase in current proposed, while at the time of the completion of the addition it will be fairly desirable, as the following indicates:

Total connected load	160 Kw. for power
	60 Kw. for light
	220 Kw.

30 Kw. increase for addition on building equals about 30/220, or 14 per cent. This may be considered as about proportionately divided between the light and power, making the

Light bill, $755.00 x 1.14	or	$860.00
Power bill, $2,283.00 x 1.14	or	2,602.00
Total for outside current		$3,462.00
Plant operation		2,973.00
Saving		$489.00
Cost of additional coal:		
$450.00 + $135.00 = $585.00		
$585.00 x 14 per cent = 81.90		$216.90
$135.00 + $81.90 = 216.90		
	Saved per year,	$272.10

Considering the fact that this building is not one of the newest type, and that its power requirements are not equal to those of the average up-to-date school, that it is contemplated to tear out and discard a large amount of low pressure steam piping, and that new partitions must be built, old walls cut, and more or less alteration work done as shown in Fig. 1 (most of which expense would be avoided in a new job), is not this fairly conclusive evidence that in a great number of cases a power plant is an economy in the modern school?

The trend is all in favor of increased current consumption; more elaborate equipment, more interesting experiments, more pumps, fans, vacuum-cleaning machines, laundry equipment, etc. All these demand current and still current; and the more current used the greater is the advantage of the isolated plant.

Suppose the school considered above should decide to hold night sessions. This would jump the lighting current to three or four times as much as at present, resulting in a saving not of $272.00, but of $2,042.00 to $2,797.00 additional. In fact, it is not at all impossible to save $2,000.00 per year where conditions are right, and this is actually being done in more than one case.

Any school whose monthly electric bill is $400.00 or over should be investigated in order to ascertain the cost and probable saving which would be obtained by the installation of a power plant for its own use.

This makes clear the architect's duty to every school board to at least provide for a possible economical installation. Had this matter been in mind in the case cited, an approach to the ideal arrangement shown in Fig. 2 could undoubtedly have been made. Here the same identical equipment is installed in a ship-shape systematic arrangement, with the smoke breeching short and direct, the high pressure steam main a loop header, giving less liability to break down and a much shorter length of underfloor trench in the engine room.

Besides this there is the element of extension always to be considered. No school board, when it builds a new building, has any idea that future extension will be required for many years. Yet extensions often come altogether too soon for comfort, especially if the boiler room cannot easily be enlarged. It will be noted in Fig. 2 that ample provision has been made for future extension on the side opposite the stack either by another installation of equal size with another stack on the far side, or by the addition of only one unit using the present stack.

HOUSE AT CLEVELAND, OHIO

FRANK B. MEADE, ARCHITECT

An Experiment in Co-operative Training in Architectural Design.

THE proximity of one institution of learning to another has often led to proposals from one to the other that have resulted in mutual material savings. These proposals have led further to still more desirable results in the fields of study, owing to a spirit of co-operative endeavor naturally fostered by such agreements. There are a variety of ways in which schools so similarly organized may draw closer together for mutual benefit. These remarks will be confined to a consideration of an experiment in training in architectural design recently undertaken in Boston.

For many years the Massachusetts Institute of Technology and Harvard University have been carrying on departments of architecture which, in the courses in design, have required very similar work from their advanced students. A series of six or seven problems given through the year have been done under similar conditions and have covered very much the same ground.

The Boston Architectural Club has been able to provide courses in design modeled on those recommended by the Society of Beaux Arts Architects and in construction, history, mathematics, etc., courses so arranged as to meet the requirements for the Rotch Traveling Scholarship. These courses have been very helpful to the younger draftsmen who have been unable to obtain an architectural education elsewhere.

In design the method in vogue at the Ecole des Beaux Arts, which has met with such universal approval, has been followed at the Boston Architectural Club since the foundation of its Atelier, and was adopted some years previous to this by the Massachusetts Institute of Technology and later by Harvard University. The student goes *en loge* with his program for a number of hours, and when his solution is decided upon it is definite and to which he must rigorously adhere in the working out of his final drawing. He retains a copy of the rough sketch which he has turned over to his instructors for reference, beside him during the time that he spends in working up and finishing his drawings. At the time of judgment the original sketch is pinned to the drawing to give the jury the key to the student's method of thought, and is of great value in gauging the ability of the student in the handling of his problem. If the sketch has not been adhered to nor carried out in its essential scheme, the finished drawing is not considered for award.

This method — almost universal to-day in the teaching of architectural design in America — has proven itself of great disciplinary advantage and also made the accomplishment of more work possible in a given time.

The spirit of competitive endeavor, without which the work of the younger designer must languish, is kept alive in all schools by exhibition of the student's work. Nor is this the only advantage of the exhibition. Comparison of his own work with that of his fellow is undoubtedly of great value to the student, who is then given a real opportunity to weigh the merits of the numerous solutions of the problem after he has become thoroughly familiar with the given conditions; to derive benefit from suggestion and also to nourish in himself the ability to criticize judicially the work of others.

The scope of benefit to be derived from the exhibition is thus unlimited in theory and becomes actually wider as the number of drawings in the exhibition is increased.

Students at the Boston Architectural Club have been unable to see the exhibition of their work done under the auspices of the Society of Beaux Arts Architects because of the difficulty, generally due to expense, of getting to New York where these exhibitions are held.

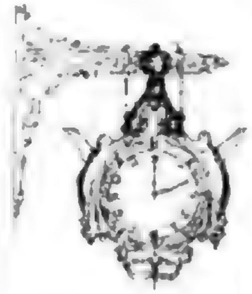
Harvard and the Massachusetts Institute of Technology have always exhibited their drawings at the end of each *rendu* in the halls at their disposal.

It was the realization of the undeveloped possibilities in Boston in this direction that led the Committee on Education of the Boston Society of Architects last year to propose to the two schools and to the Architectural Club a scheme of co-operation in their work in design. This proposal was met by the hearty approval of all, and in so far as dissimilar schedules in the three schools have made it possible, dates have been set for problems to be done simultaneously and exhibited in common.

For a year the principle of co-operation as applied to architectural training has thus been on trial and seems to have proven itself successful and capable of development. To-day, however, owing to different calendars, Harvard and the Massachusetts Institute of Technology are still doing the greater part of their work in design independently, though it is confidently expected that as opportunity permits, more and more of these problems will be done in common. The Boston Architectural Club still continues its work under the Beaux Arts Society system and will continue to do so. The work of its students under this system is sent off as usual to New York for judgment. The problems arranged in common with Harvard and the Massachusetts Institute of Technology are supplementary and are offered as an option to the student.

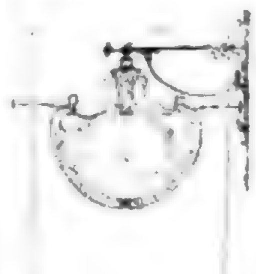
A jury consisting of three representatives from each school judges the finished drawings, which are alternately exhibited at Harvard, Technology, and the Architectural Club. The meetings of this jury have been interesting and have led, through consideration of the drawings in question, to discussions that have been of benefit to all concerned. A close understanding now exists which should lead to a more comprehensive and valuable course offered to the student.

The drawings illustrated on the following pages are those premiated in a recent problem given at the same time to the three schools. The program required a design for a large ornamental clock to be suspended from the second story of a jeweler's establishment on an important city street. Two vertical faces which could be illuminated at night and each of which should have a dial three feet in diameter were to be provided.



Preliminary eight-hour sketch for design shown on the left.

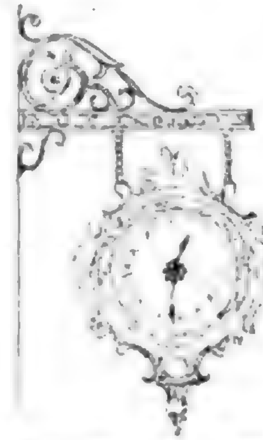
Preliminary eight-hour sketch for design shown on the right.



DESIGN BY V. W. JORGENSEN
PRIZE, SPECIAL COURSE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DESIGN BY O. R. FREEMAN
PRIZE, REGULAR COURSE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

COMPETITIVE DESIGNS FOR AN ORNAMENTAL STREET CLOCK



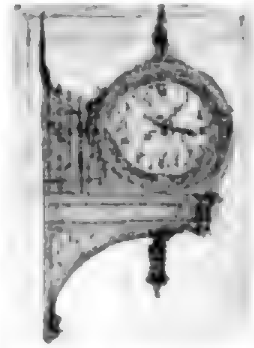
Preliminary eight-hour sketch for design shown on the left

Preliminary eight-hour sketch for design shown on the right

DESIGN BY W. S. VAUGHAN
MEDAL, HARVARD UNIVERSITY

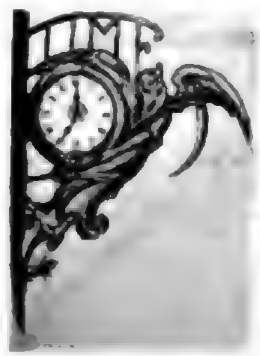
DESIGN BY SIGMUND NESSELROTH
PRIZE, HARVARD UNIVERSITY

COMPETITIVE DESIGNS FOR AN ORNAMENTAL STREET CLOCK



Preliminary eight hour sketch of design shown on the left.

Preliminary eight hour sketch of design shown on the right.



DESIGN BY ARTHUR R. HUTCHASON
MEDAL, HARVARD UNIVERSITY

DESIGN BY R. DE GHETTO
PRIZE, BOSTON ARCHITECTURAL CLUB

COMPETITIVE DESIGNS FOR AN ORNAMENTAL STREET CLOCK

PLATE DESCRIPTION.

Haddington Branch, the Free Library of Philadelphia, Philadelphia, Pa. Plates 49-51. This library building shows an interesting treatment of simple wall surfaces through which distinction is gained for the whole composition. The design of the façade is composed of five arches, the central one of which is slightly larger and carried out in ornamental terra cotta to mark the principal entrance. The intervening wall surfaces have been carried out in a simple brick bond so that all emphasis is placed upon the central bay. The open portico is an exceedingly good example of the use of polychrome terra cotta. It is finished in a lustrous glaze in blue, yellow, and green. The interior walls of the portico are rusticated, and at regular intervals there are conventionalized blocks ornamented with old-looking volumes in low relief. This treatment forms a sort of diaper pattern which culminates in deeply coffered panels around a central rosette forming the vault overhead. The exterior lighting of the entrance has been so arranged that the beauty of this feature will be distinctly brought out at night.

Polychrome terra cotta has similarly been used in the frieze to give a touch of color and ornament, and here special plaques have been incorporated bearing various printer's marks.

The interior of the building has been executed with simple plaster walls and dark stained oak woodwork with linoleum covered floors.

Charlestown Branch, Boston Public Library, Charlestown, Mass. Plate 53. This building is located on Monument Square, Charlestown, on a lot which slopes sharply to the rear. This fact was taken advantage of in planning the building, so that a large lecture room was provided in the basement with a direct entrance from the street.

The library proper is reached through two entrances located at the grade, one of which leads directly to the children's reading room on the first floor and the other to the main reading room on the second floor.

Practically all the space on the first and second floors is given over to the use of the public, there being no necessity of stack room other than that which is provided through shelves on the walls and in bookcase alcoves arranged between windows.

The exterior is faced with a dark red brick laid in running bond with headers in every sixth course. The trim is limestone, and the sculptured seal, which provides a note of accent on the entrance façade, is that of the Boston Public Library.

Chapel of St. Simon the Cyrenian, Philadelphia, Pa. Plates 54, 55. This church shows an interesting use of brick in a building of the Gothic style. The exterior is faced with a red repressed stretcher brick. This material has been used for practically all details of the façade, including copings, sills, and mullions, and in addition to eliminating the cost of stone trim it gives the building a distinctive character not to be had through more elaborate means. The roof is of variegated slate, and gutters and leaders are copper.

The present window mullions are of wood and are temporary, it being the intention at a future date to insert limestone mullions with permanent memorial windows. The interior is simply carried out in plaster with an open timbered roof of oak. The chancel fittings and pews are also of this wood.

The cost of the building, including furnishings and architect's fee, was 25 cents per cubic foot, excluding the basement and taking the mean height of the roof in the computation.

The St. Andrew Methodist Episcopal Church, Philadelphia, Pa. Plate 56. This small church has been designed following the precedent of Mexican architecture. It is constructed of brick, the exterior finish being stucco. The roof is of red Spanish tile and trimmings are of white matt glazed terra cotta. The interior is chiefly characterized by the large tile dome which covers the greater portion of the auditorium, and the manner in which the organ has been arranged.

It is intended at a future date to construct an addition to the rear which will provide space for Sunday-school purposes.

Stable and Garage of W. D. Straight, Esq., Westbury, Long Island, New York. Plates 57, 58. This building is built with an L-shaped plan around a large square court, the other two sides of which are formed by a high brick wall. The entrance to the court is at the angle of the enclosing walls on the main access of the building.

The garage is situated in the center of the group, and long wings to the right and left contain, respectively, the stable and carriage room, and a group of three cottages for help employed on the estate. The latter has a distinctly domestic appearance and shows many charming characteristics of English country buildings.

The exterior walls are constructed of a rough texture red brick laid in a wide white mortar joint. The roofs are covered with small shingle tiles, as are also the cheeks of the dormers.

House of Hudson Moore, Esq., Atlanta, Ga. Plate 64. This house is located on Peachtree Road, about five miles from Atlanta. It is constructed of a rough texture brick on the lower story and half timber and plaster on the second. The brick wall is laid in Flemish bond, the colors running through dark reds and browns. The timber work is of undressed lumber, stained brown. The plaster is tan color. The terrace and porch floors are of tile and the sun parlor is faced with the same brick as used on the exterior walls. An interesting detail of the house is the carved barge boards over the entrance and the heads which appear under the belt course at the second story level and on the gable brackets.

The interior is finished throughout in birch and the total cost was $15,000.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THERE have been numerous and able protests from writers and scientific associations against the erection of the power house in Washington on the banks of the Potomac. These bodies and individuals are qualified by knowledge and experience, represent varied interests, have received honors of far greater merit than are conferred upon the majority of federal legislators, and are dealing with a subject of which they are thoroughly cognizant. Yet, despite this fact, the Congressional Records of February 14th and 25th display on their pages remarks and controversy by legislators which are evidently made in the sincerity of ignorance, in opposition to these able protests. What is the cause for this condition of affairs? In matters of life and death, the word of the physician and the surgeon is sought; in matters of law, that of the able jurist is desired; but in matters of art and of the word of the artist, there is no man so mean as to do him obeisance. And yet the question of art and of architecture is as vital as that of health and justice, as it is the permanent and conspicuous environment of both.

The legislator is supposed to represent his constituents, and the majority of his constituents are as ignorant of all appreciation of art as they are of medicine or law; but they know they are ignorant of the latter, because they get into immediate material difficulties if they attempt either, but treatment of artistic problems carries no penalty with it that an uneducated man recognizes. He therefore feels safe in making decisions without qualifications and belittling protests which he does not appreciate and which irritate him.

Artistic expression is varied and of many degrees and can be judged only by comparisons.

A protest against a disfigurement of the architectural scheme of Washington, of which the people are already proud, must be such as to convince the public, and then there will be no opposition of the legislators. That this conviction is already taking place is evidenced by the resolutions of the American Institute of Consulting Engineers and the National Association of Builders Exchanges, and many others who are in no way affiliated with artistic professions. It is possible that this very discussion, which is so well presented in the "Appeal to the Enlightened Sentiment of the People of the United States," will be a very definite factor in the education of the people on these matters, which education cannot be too widespread or undertaken by too many different interests.

IN the annual report of the American Academy in Rome which has just been received it is gratifying to read that the European war has not had such dire effects on the administration of the school as was generally expected at the beginning of the conflict. The enrolment of students has not been lessened and activities have been carried on without any serious curtailment save for such inconveniences as the closing of certain districts in northern Italy to students and travelers and the need for prudence in sketching in other parts of the country. Considering the fact that the Academy also embarked upon the occupancy of its new quarters on the Janiculum during this perilous period, it is indeed a commendable record of achievement that is presented.

SIR THOMAS JACKSON'S admirable volumes upon Gothic Architecture* are of very great value if only for the charm and beauty of his pencil drawings, which are both skilful and appreciative of the qualities of the subjects, and have the delicate, affectionate touch of the man who loves his art, and also because his book is a very compendium of Gothic work throughout Europe in its text and illustrations, and his sensitiveness in regard to the phases of Gothic Art is refreshingly free from dogmatism.

Naturally he defines the term "Gothic" and considers that it is an art which grows from structure without conventional bonds, is as free in its expression as it is sane in its methods, and is based upon the intention of good building with true economy developed and embellished by æsthetic detail. It therefore has amazing variety and possibility of protean changes, controlled by the desires stated. When its structural qualities approach perfection, as at Amiens, there is always the danger of the coldness of a precision, which is absent in the less skilled and tentative intimate efforts of a less perfect knowledge. It developed from the well intentioned incompetence of the Romanesque into an art which became as nearly scientific as the times permitted in France, and Sir Thomas Jackson thoroughly comprehends that so sensitive a means of expression, unhampered by canons of form such as the orders of architecture, would at once reflect the character of its builders.

He acknowledges that the French are devoted to precision to the ultimate point in their work, while the English make constant compromises: that the French reason out their achievement, while the English cling to traditions, and that therefore French Gothic develops in sequence logically and its phases are definite and progressive, while in England the Romanesque wall lingers between the buttresses, and the immediate precedents dovetail into the new experiment. Also, he feels that homely imperfections create a certain charm in themselves. It is natural that Mr. Moore's book on the same subject does not content him, but he treats it with the respect it deserves and without acerbity, and is himself so far from being a doctrinaire that he is absolutely sympathetic by nature with the Gothic styles.

* [illegible] Italy. By Sir Thomas Graham Jackson [illegible] Crown 4to. Two volumes. [illegible]

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

MAY, 1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS

GIULIO ROMANO

BORN 1492. DIED 1546. ARCHITECT OF VILLA MA-DAMA AND PALACE OF CICCIAPORCI ON STRADA DI BANCHI, ROME, AND PALAZZO DEL TÈ AT MANTUA

THE BRICKBVILDER

VOLUME XXV MAY, 1916 NUMBER 5

Modern Practice in the Design of Bank Vaults.

I. PROTECTIVE PRINCIPLES AND CONSTRUCTION METHODS.

By FREDERICK S. HOLMES.

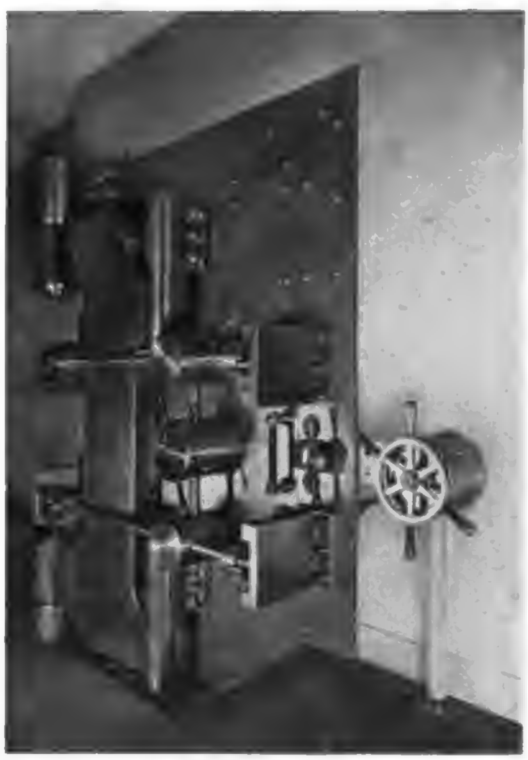
ENSHROUDED in mystery, chicanery, and deceit to a degree not approached in any other mechanical line, the manufacture of safes and vaults, until within a few years, had been so handicapped that relatively little progress was made in the essentials of the art, and even now these sinister influences are frequently in evidence.

Such conditions are, in a way, probably a logical corollary of the large element of empiricism that exists and must always be considered in any design intended to produce work that will satisfactorily comply with constantly changing requirements, many of which are of unknown quantity — as the skill and resources of the burglar.

Put otherwise, while many of the elements of vault planning are governed by the rules of mechanical and structural engineering, there will always remain large and obscure factors of resistance which can be termed the mob or burglar "stress"; new methods of attack that may at any moment be evolved, either by a sudden individual inspiration, the regular progress of scientific investigation, the discovery of some new principle, or the perfection of a well-known one, which may nullify in whole or in part present schemes of defense. Such things have occurred in the past and are happening today.

For instance, long ago safe and vault doors were made with straight, stepless edges — a design strange to say, and for reasons which will be explained, now considered desirable. This type was found to permit of successful attack by wedging and, as a result, it was superseded by one having joints provided with one or more rebates; this pretty well obviated the weakness of the straight joint, but was soon found to permit lodgment for explosive substances, to circumvent which the so-called "tongue and groove" stepping was then designed. This appeared to be a final improvement; the grooves were packed with felt and it was shown that gunpowder could not be forced beyond the packing, and that it was difficult to force wedges around the tongues.

Then came liquid explosives; the felt absorbed nitroglycerin and became dynamite, automatically placed just where it would do the most damage; so a non-absorbent packing was substituted, such as asbestos, rubber, or more recently a trade article consisting of a rubber base or matrix filled with graphite. All of these stop the flow of a liquid explosive, *until it is fired*, then the space that they have occupied becomes a hole or pocket, ready made for a fresh and mightier charge, for anything like soft rubber cannot resist nitroglycerin — it simply vanishes.



Exterior View of a Modern Forty-ton Vault Door

This illustration shows a crane hinge and pressure mechanism. Note combination lock dials and bolt-throwing handle on the jamb, also portion of movable platform in lower position and hand wheel for operating same.

Will it be believed that all of these packings are widely, almost universally, used today in both old and new work for the purpose of stopping explosives? Such is the fact, and the owner remains in blissful ignorance of the danger. This is only one of many examples that might be used to illustrate the point.

Other conditions, unfortunately, have also operated to retard progress, such as commercial competition, always strenuous and frequently unfair, the inactivity of the burglar in this particular field, and a lack of knowledge on the part of most bankers of the difference between good and bad design.

So long as vault builders were permitted to design work, and so long as architects and their clients remained in ignorance of the fundamental principles of protection, little real advance was made; but since the vault engineer started his campaign of education, uncovering the sophistries of the trade, exposing the fallacies of their

Exterior View of Fifty-ton Door
Note movable platform in lower position

arguments and the inefficiency of their designs, and demonstrating the serious inadequacy of the work that was being built, the salesman is frequently eliminated from the problem and the engineer substituted, with the result that work is designed to meet the real needs of the banker instead of following the general methods of the manufacturer, which however profitable are largely obsolete and should have been abandoned years ago.

Under the older system many vaults have been and are even now being built, some of them costing hundreds of thousands of dollars that are neither burglar nor fireproof, and not even waterproof. Only the fact that they are installed in fireproof buildings and well watched can account for their safety to date. Many of these vaults are mere masses of metal, without a vestige of fireproofing on the outside, and in the event of a conflagration sufficient to sweep through the building, their contents would undoubtedly be incinerated. This is not theory, but has in part been demonstrated in a recent fire.

Furthermore, the entrances to some of these vaults are protected by doors having bolt-work which is operated by spring-boxes, tripped by time-locks. Even a burglar's apprentice could put a hole through the wall of such a vault near the door in a few minutes with a cutter-burner, reach through with a rod and trip the time-lock lever, when the bolts would automatically retract and the door could be opened as easily as at nine o'clock in the morning — only another illustration of the truth of the statement that the integrity of vault-work lies chiefly in its design.

The designs upon which such vaults are built might almost be called criminal. It is hardly to be supposed, however, that the institutions which purchase work of this character can know that they are buying "gold bricks."

Banks and trust companies are not the only disciples of unpreparedness. During an investigation made for the United States Government a few years ago conditions came to light that were appalling. Fortunately, the worst of these have been remedied, although many remain with little or no improvement.

The report of this investigation was termed by the then Secretary of the Treasury a "Burglar's Guide" and has never seen the light of day. As a matter of fact, it might well have been termed "Guide Number Two," as an investigation carried on under the auspices of the Fifty-third Congress about twenty-five years ago, the results of which were put in pamphlet form and scattered broadcast, was then considered as containing ample instructions for the looting of Uncle Sam's treasure houses.

That the first report had no appreciable effect upon the then existing conditions was disclosed by the second investigation, where one typical finding was that of a brick coal-vault in the cellar of a Government building containing ten million dollars' worth of gold bars. The oldest employee could not remember when this coal vault was used for any other purpose.

Much has been said of late regarding the practicable use of the oxy-acetylene or oxy-blau-gas cutter burner in mob or burglarious operations; the field is wide and interesting. In the earlier days of this invention it was not looked upon by the safe-building fraternity in general as much of a menace, but the prophetic imagination of a few discerned its almost unlimited possibilities, and some designs of recent years show attempts to provide factors of resistance.

To-day it may be said that there is absolutely no material, nor combination of materials commercially available that will afford full and adequate protection if to the cutter-burner outfit is added the welding torch and the blau-gas flame. Ordinary concrete loses its strength upon the application of great volumes of intense heat and is readily removed even when heavily reinforced.

Steels of all kinds are pierced and cut with what, to the layman, is almost unbelievable rapidity. In a recent demonstration made before a party of bankers a hand hole six inches in diameter was cut through a sample of vault lining three inches in thickness in just three minutes. A hole sufficiently large to admit the body of a man can be cut in ten minutes, and all of the apparatus to do this can be carried in a suitcase.

Anti-cutter-burner alloys are a help to the situation, but even they, although not able to be cut as steel is cut, can be melted when several welding torches are combined.

The best that can be done to-day is to provide concrete walls of great thickness, two and a half to three feet or greater, if space will permit; the concrete to be formed of especially dense cement and a non-hygroscopic aggregate, strongly reinforced with heavy interlocked metallic sections and backed by contact with a heavy lining, combining steels of high tensile strength and ductility, with toolproof and cutter-burner resisting sections, arranged and interlocked to produce the greatest possible resistance to all of the various methods of attack. It is necessary to require not only that each of these methods be used, but that they alternate, to extend the time of attack to the

greatest possible length, compatible with an economical cost of construction.

Less difficulty is experienced in producing doors and frames of the requisite strength, mainly because greater expenditure is permitted at the entrance for the double purpose of providing the greatest protection at the point oftenest attacked, and to indicate by its appearance that the vault combines the necessary elements of strength and resistance; in other words, it is the entrance of a vault which can best be made to advertise its presumed inherent qualities.

Doors up to three feet in thickness have been and are being built, and this thickness is divided into layers comprising materials highly resistant to all known methods of attack, and by a modification of the ordinary locking systems, whereby the time lock is located upon the door and the combination locks and bolt-throwing mechanism upon the jamb, all of this work being heavily housed upon the inside, both the door and jamb, in the event of an attack, must be penetrated to defeat the locking mechanism, or a complete man-hole must be put through the vault walls; this maintains the proper relative strength of the doors and walls and constitutes what is known as a balanced design.

The entrance can be, and usually is, made several times stronger than the walls. Here again, however, the question of correct design is the key to successful construction, as mass, weight, and thickness do not of themselves necessarily spell strength, nor is it logical to design work in which the factors are of disproportionate strength.

Among other recent improvements in important details is a unique and interesting substitute for the usual combination lock-dial. It takes the form of a steel cylinder approximately six inches in diameter, disappearing angle wise into the top of the front pressure mechanism housing on the door jamb. The front end is provided with an oval glass window behind which, at a distance of some eight inches, is an electrically illuminated stationary dial provided with two revolving pointers, each of which is connected to a combination lock and to an operating knob located on the side of the housing. This device is not only one of convenience, as its window is located at a height corresponding with the normal line of vision, but also one of efficiency; it absolutely prevents any one from overlooking the setting up of the combination numbers.

The stepless round door, or a door without rebates which is ground into its frame as a glass stopper is ground into a bottle, is another logical improvement, due to the fact that with increased thickness of doors as a whole, and of their component sections, all methods of attack have been pretty successfully met, with the exception of the use of liquid high explosives, for which the usual rebates or steps of doors form reaction seats, against which the explosive force can act to blow out the doors. By the elimination of these seats and the grinding of the doors practically metal to metal, it is almost impossible to insert liquids into the joint; while the force of an explosion in the crack, finding no seat upon which to act, expends itself both inwardly and outwardly without affecting the security of the door.

Vault engineering is recognized to-day to be as necessary as any branch of specialized engineering, and the banker and architect who employ such services get far better results than can be had in any other way, both as regards the quality of work and economy of cost.

Broadly, the functions of the vault engineer include consultation with the bank, a study of the requirements of all departments which in any way relate to the vault, and the making of recommendations looking to the betterment in methods of storage and the handling of securities and moneys.

He is at the service of the architect who may consult him in order to effect a proper relation between the vault construction and that of the building, including such features as location, supporting foundations, connections between the vault and the building framing, arrangement of observation spaces and patrol passageways, lighting, ventilating, and general finish, and for whom he prepares detailed plans and specifications covering designs that will permit of the fairest competition among the build-

Thirty-six Inch, Fifty-ton Entrance Door and Frame

Note level walk-way, bolt-throwing hand-wheel and illuminated dial-case on frame, and combination lock-operating knobs on front jamb pressure housing. All surfaces of door, frame, hinge, and other mechanism finished in draw filed steel.

ers, with a minimum requirement of special patterns or methods of manufacture.

The cost, a factor in which, needless to say, the banker is always much interested, is kept within economic limits by insuring legitimate competition through the submission by the architect to the manufacturers of a single form of plans and specifications drawn by the engineer.

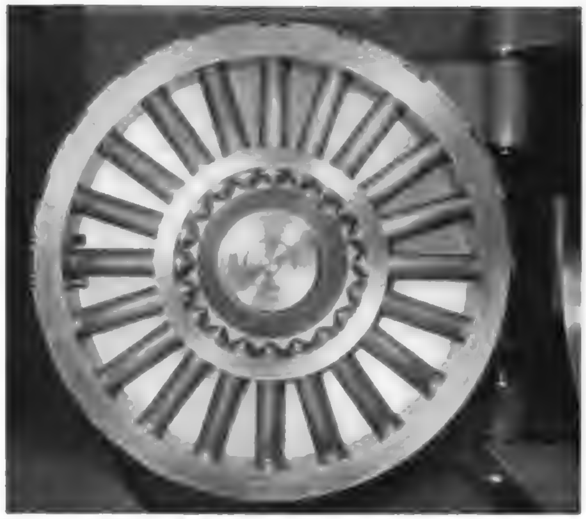
The engineer also furnishes a form of contract, since the usual "Uniform Agreement" does not cover this work.

He criticizes and approves all shop drawings (which in some contracts run into the hundreds), furnishes factory and field superintendence, inspects workmanship and materials, and conducts tests; in other words, he correlates the requirements of the owner and the architect with the manufacturer's ability to produce.

The subject of vault design falls naturally into four divisions represented by the view-points of the banker, the architect, the engineer, and the manufacturer; and no scheme should be considered complete until the requirements of each have been carefully studied and the whole intelligently brought together in design.

Among the major requirements of the bank are those of safety, accessibility, and convenience. The location of the vault and the surrounding conditions should be such as to permit of a maximum supervision during office hours and complete patrol or observation of not only the four sides, but also the top and bottom at all times.

Where a vault is located upon the ground, observation of its bottom is secured by setting it upon narrow steel and concrete piers which raise it from the solid concrete foundation. The spaces between these piers are illuminated and seen by means of inclined mirrors protected by glass floor sections; a similar scheme is often used for seeing the top. In one instance, where the vault is located above a basement space not under control of the bank, and where it is not desirable to permit the bank's watchman to patrol, reversed periscopes are installed, making it possible to see the under side from above.



Elevation of Bolt-work Designed to Give the Impression of Strength and Solidity

Note entire absence of all operating or locking mechanism which is concealed behind the background of the bolt-work. The time-lock is located within the center drum and protected by a heavy steel door. Each holding bolt weighs approximately two hundred pounds. The entire finish is in draw filed steel.

A secure route of communication between the vault and banking room cages is essential, and the arrangement of the interior of the vault should be such as to provide safe, convenient, and systematic administration.

The interior equipment, consisting of safes, closets, shelving, filing devices, etc., which will be considered in a second paper, requires special study to take care of present business and to provide for future expansion.

Precautions must be adopted to avoid locking any one in the vault, ways provided to learn if such an accident occurs, and methods adopted to permit of releasing one locked in; this must in no way endanger the security of the work.

As the vault is usually considered a sort of holy of holies, its appearances should be attractive and impressive and serve as an advertisement of the strength of the structure.

Proper lighting and ventilation are required as well as such further conveniences as special sealing devices designed to obviate the necessity of pasting seals across the joints of safe and locker doors during the time of examination; messenger call and emergency alarm buttons, located at readily accessible points; outlets for portable lights for use in searching storage spaces, or for use when repairs are being made or the locking devices adjusted, which do away with the hitherto inevitable candle with its attendant dripping and danger.

Telephones are frequently made a part of the equipment.

A lowering platform is usually installed to provide a level walkway between the banking room floor and the interior of the vault. This is always desirable, and if heavy omnibuses,

View Looking Into Vault

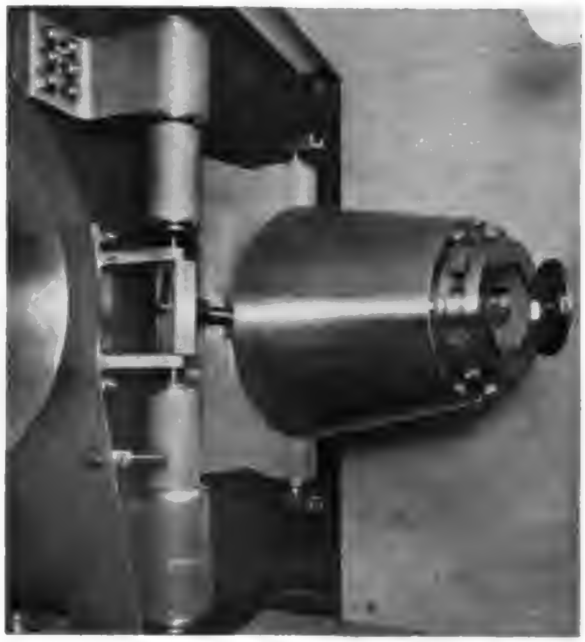
The frame of this doorway is thirty-six inches thick. Note double sliding day gate, flush, level walkway, and bolt-throwing wheel and illuminated dial-case on front pressure mechanism jamb housing.

coin, or bullion trucks are to be used, it is a necessity.

Day gates of varying strength and beauty are used to guard all entrances.

If the vault is to be used for a safe deposit business, either separately or in conjunction with the bank's own business, it is desirable to finish the work both outside and inside more attractively than when it is to be used purely for the bank, and the size and proportion of the vault should be established by a determination of all details of the interior equipment.

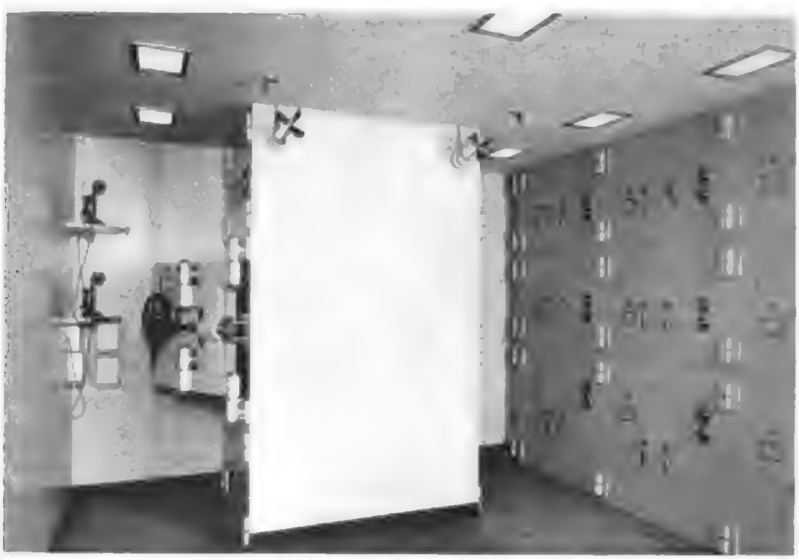
The architect as a rule is not interested in the technique of vault design; but he is concerned in the production of a structure that shall satisfy his client and be 100 per cent efficient, and one that shall also fit into the design of his banking room in its proportion and its finish. He is further concerned with the manner in which it shall relate structurally with the floors, foundations, and framing of the building. He is, furthermore, anxious to secure for his client the most satisfactory results at the least outlay, and to accomplish all of this he includes the vault and its fittings in his work as being a part of the building, and devotes to it such study as may be necessary to relate it properly to his general design.



Emergency Door, Thirty-six Inches Thick
Note crane hinge, three-point pressure mechanism, and time lock behind cover door (shown in open position)

There are two usual schemes of external treatment of vaults. In one, the structure becomes (in appearance) a part of the building, and depends wholly for effect upon the treatment of its entrance. This condition is sometimes made necessary by the general scheme of interior arrangement and architectural design, though however complete may be the result of the general interior finish of the room the vault itself loses much of the quality of impressiveness, which is retained when the structure is individualized by external treatment and made to appear as a huge safe; the psychological effect produced by such treatment should not be lost sight of, as it is a valuable asset in its effect upon customers of the bank and the public.

In this paper only the general features of the subject have been mentioned, but it is hoped that what has been said, together with a consideration of interior fittings to appear later, will serve to indicate to the architect a few of the difficulties and intricacies of conditions that are continually met, and show the more efficient solution of the problem that may be had through a wider employment of the vault engineer. No two installations are ever alike, and each one should be studied with relation to its own particular problems, which can be satisfactorily solved only by the results of wide, specialized experience.



Interior View of Trust Company Vault Showing Typical Arrangement

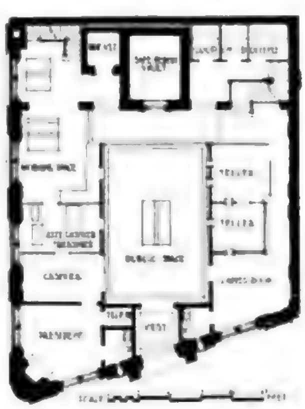
Note security closets and reserve safe, also interior and exterior telephones, flush lighting fixtures, inlet register at end of aisle, ventilating fans and cork-tile floor with sanitary base. The floor line adjoining truck closets is flush with bottom of doors. The walls are finished in light gray paint with a semi-dull surface and the ceiling is stippled white.

Some Recent Small Bank Buildings.

SELECTED FROM THE WORK OF CROW, LEWIS & WICKENHOEFER; R. CLIPSTON STURGIS; C. HOWARD WALKER AND RALPH H. DOANE; WAIT & COPELAND; AND ELLICOTT & EMMART.

ENTRANCE FACADE

THIS bank building is located in a suburban community near New York City and was designed with simple architectural motives to make it fit in harmoniously with the surrounding buildings, which are of a simple suburban character, and to bring the cost of the structure within a moderate figure. The materials used in the external walls were red brick of rough texture laid in white mortar with flush joints, and limestone for cornices, entrance, and other details. The frame of the doorway and the grille over it are bronze. Ornament on the exterior has been confined to a well designed panel over the entrance door and a band of Greek fretwork over the windows between the pilaster capitals.



The arrangement of the main banking room and working departments is shown on the plan reproduced herewith. In the basement, reached from a stairway at the left of the book vault, compartments are provided for gold and silver storage, and on a mezzanine floor over the vault is a directors' room reached by the stairway shown at the right of the safe desposit vault.

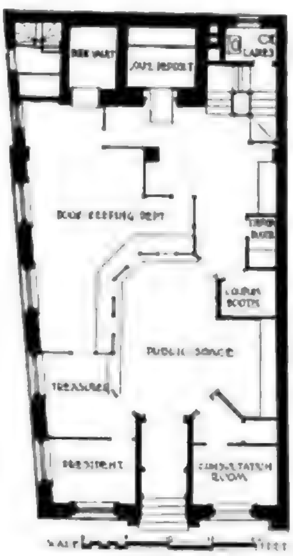
The interior walls of the banking room are finished in plaster and the floor is of terrazzo. The bank screen is bronze with a marble base.

The roof is flat, and a large skylight over the public space together with the large windows on the side afford good, natural lighting.

FIRST NATIONAL BANK, MONTCLAIR, N. J.

CROW, LEWIS & WICKENHOEFER, ARCHITECTS

GENERAL VIEW OF EXTERIOR



MAIN FLOOR PLAN

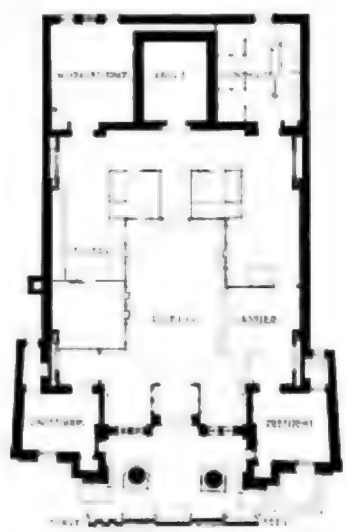
VIEW OF INTERIOR

SECURITY TRUST COMPANY, ROCKLAND, ME.

R. CLIPSTON STURGIS, ARCHITECT

ENTRANCE FACADE

INTERIOR, LOOKING TOWARD ENTRANCE



MAIN FLOOR PLAN

FIRST NATIONAL BANK, WEST ORANGE, N. J.

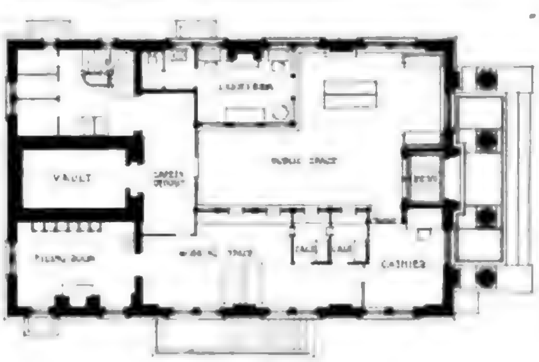
C. HOWARD WALKER AND RALPH H. DOANE, ASSOCIATED ARCHITECTS

ENTRANCE FACADE

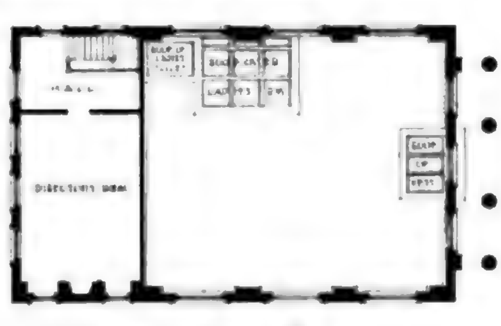
THE Winchester Trust Company building is planned to form a component part of a civic center which is being created in this suburb to the north of Boston. The exterior design is of a simple type of classic architecture carried out in rough textured red brick for the main walls and white marble for the columns, pediment, and other details.

The base course is granite and the portico floor, two steps above the grade, is paved with brick.

The arrangement of the first floor and the small mezzanine floor, on which the directors' room is located, is shown on the accompanying plans. Access to the safe deposit department is had at the end of the public space and coupon booths are located to the right of the vault. The floor of the public space is paved with 9 by 12 inch marble tiles and the remainder of the floor area is covered with linoleum. The interior walls are paneled in plaster and the ceiling is flat with ornamental plaster beams.



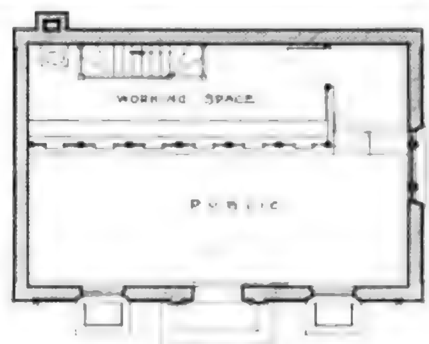
FIRST FLOOR PLAN



MEZZANINE FLOOR PLAN

WINCHESTER TRUST COMPANY, WINCHESTER, MASS.

WAIT & COPELAND, ARCHITECTS



FLOOR PLAN

THIS building is one of several small branches which the Provident Savings Bank of Baltimore maintains for the transaction of suburban business and the convenience of depositors. They are open at certain hours during the day and on certain evenings, and inasmuch as no valuables are left in them, no vaults are required.

The exterior walls of this branch are of rough textured, dark red, local brick with white painted wood trim. The roof is covered with green slate. The construction is non-fireproof and the cost per cubic foot was approximately 23¾ cents.

HAMPDEN BRANCH OF THE PROVIDENT SAVINGS BANK, BALTIMORE, MD.

ELLICOTT & EMMART, ARCHITECTS

Architectural Features of the Garden.—I.

By JOHN T. FALLON.

THE art of garden design in America is still in its infancy. We have not yet grown to feel that the garden is as essentially necessary as the house and that it is as much an expression of the life of the family out of doors as the house is of the indoor life. I am speaking of the garden in its broadest sense, that is, any arrangement of the grounds around the house.

In a general way the architect should have charge of all garden design. Especially should there be left to him the fashioning of the various architectural details, such as balustrades, pergolas, etc., which reecho in the grounds the details of the house itself and unite the two in a homogeneous whole. In fact, many of the villa gardens of Europe use the house merely as a point of departure and carry the accessories to much greater lengths. While we can never hope to rival here the gardens of England, which supply us with most of our inspiration, the architectural details of our modern gardens present a creditable showing when compared to modern European work.

The main purpose of garden design is a skilful division into many parts. Just as a house requires a number of rooms, and as it needs a careful disposition of its departments and corridors, so similarly a garden needs subdivision. Even the broadest landscape treatment needs to be defined by walls or fences, while in the more usual and intimate garden the division into self-contained areas provides charm, variety, and interest.

In building a garden wall, steer safely between the undesirable extremes. A wall is a piece of building; it is by nature architectural and should have that quality of precision in form and outline which architecture demands. At the same time it should be of the garden, unobtrusive and yielding readily to the mellowing process of time. Provided it is well designed and executed in a harmonious material, no amount of form or ornament need be out of place. Texture in material is especially desirable in a garden wall, that is, a texture sufficiently rough to invite the growth of plants and vines and to aid the action of the weather. Between the immaculate stone steps and smooth brick walls of one extreme and the rustic work of the other there is a narrow path which leads to good taste in walls.

Ashlar should be employed only on formal work. The best stone wall is one of local stone laid with bed joints and narrow courses. When of brick the color should not be any of the ordinary red bricks, but a dark stock that will soon neutralize and blend with the vegetation. In laying out the direction of our walls, do not forget the possibilities of variation in plan. Instead of stretching the wall in a straight line from point to point we can

Steps and Terrace Leading to Veranda
Garden of Mrs. Harry Payne Whitney, Roslyn, Long Island
Delano & Aldrich, Architects

Gate in "The Causeway," Garden of James Parmelee, Esq. Washington, D. C.
Charles A. Platt, Architect

here and there recess it in square or circular bays, round an angle in a segmental sweep, or break it backward or forward.

It is well at the outset to convince oneself of the beauty and utility of walls — such structural divisions will never be regretted. Their beauty will grow with time, they cultivate a sense of proportion, and by defining the units of the garden, they aid in dealing with the remainder of the design.

It is not necessary to furnish the openings with gates or to mark them with any architectural motive. A simple break in the wall or hedge is all a modest garden will require. When, however, we desire a little more elaboration, the gateway provides one of the most fascinating subjects in garden architecture. It is a delight to see an opening to the gardens beyond framed by the formality of an architectural gate. It is worth erecting a barrier if only to give occasion for allurement beyond. The many gateways, gates, and archways that are the pride of so many old-fashioned English gardens are not a vain show, but witness to the essential idea of a garden plan, of passing to and fro between the many rooms of the garden.

Piers should harmonize with the walls; in silhouette they should suggest the importance of the gateway. Even when the actual gates are omitted, it is often desirable to build piers, and these may be of many types — ashlar with classic cornice and plinth, or formed of the irregular masonry of the garden wall.

The wrought iron gate is particularly suited to garden use. At the close of the seventeenth and the beginning of the eighteenth centuries the craft of the smith was brought to great perfection. Magnificent compositions were constructed as open screens, sometimes as the frontispiece of the garden, or again as a semi-background to a fine scheme of garden color. This perfection of artisanship was carried even into the simplest garden gate.

Wooden gates may be used where stone or iron is too costly. There are many excellent models to follow for both the solid oak and the painted door.

In a broad sense the word "terrace" may serve to describe any piece of ground which has been leveled and defined in relation to a building. Its chief function is to give stability to the design, correcting unfortunate levels, and generally providing the base on which the entire layout depends. As an out-of-door room it can be paved and furnished with seats and other garden furniture. As a platform from which to enjoy the view, it should be bounded by balustrading or an iron railing, combined with a flight of steps to a possible lower level. This can be made a very attractive composition viewed from below. On a sloping site, level off the ground adjacent to the house to a sufficient distance to give it restfulness. We should strive also to make the paved terrace when adjacent to the house as habitable as possible for sitting out of doors.

Beyond the main terrace will be others, planned as far as possible to provide the best viewpoints to see the gardens. In some situations the terrace motive can be overdone. When the slope of the ground is not steep, it is better to accept the slope and to correct it only at intervals where a level walk seems most desirable.

Wrought Iron Gate, Garden of Mrs. Harry Payne Whitney
Roslyn, Long Island
Delano & Aldrich, Architects

STEPS LEADING TO PARTERRE, GARDEN OF W. STORRS WELLS, ESQ., NEWPORT, R. I.
JOHN RUSSELL POPE, ARCHITECT

STEPS AND BALUSTRADED TERRACE, GARDEN OF FRED B. PRATT, ESQ., GLEN COVE, LONG ISLAND
TROWBRIDGE & ACKERMAN, ARCHITECTS

The stone balustrade is the most beautiful finish to the retaining wall of the terrace. If this is too costly, lengths of plain, unpierced walling may be broken by short bits of open balustrading. A low terrace wall sixteen inches high with a flat coping provides a comfortable and convenient height for sitting. Many interesting forms of balustrading are made of brick and tile, pierced strap work and geometrical designs being fairly easily arranged with special tiles.

Garden House at Rosemont, Pa.
Duhring, Okie & Ziegler, Architects

Projecting bays in the plan of a terrace may be made to screen a portion of the garden or to afford a special view. These pleasing variations diversify the terrace and give interest to its wall and balustrade.

Changing levels constitute one of the garden's charms, and the steps and stairways hold the differing variation in levels together. A flight of steps is a graduated walk, broken at regular intervals by the vertical and horizontal planes. The shape of steps and balustrades should be graceful and quiet in outline. The size both in width and general proportions should be suited to the parts of the garden which the steps unite. Buttress the steps by some prominent feature at its side; group the steps with some outstanding mass of foliage or architecture and you will find their charm thereby increased.

Reproduced from The Architectural Review, London

Garden House in Garden of Bridge House, Weybridge, England

Provided there is some little depth, the descent from a terrace may be made into a composition of beauty and dignity. The steps can be led down in two flights, turning in opposite directions to unite below. Or they may unite on a central platform and then turn to land at separate points. With fine balustrades to mark the sweeping curves or returning flights, statuary or vases may be added to heighten the effect.

Wherever the stairway is not treated in a strictly architectural way with stone balustrades, vases or figures guard against too finished a surface to the stonework. Steps by themselves without architectural detail should appear to be formed from the ground itself and should be roughly jointed and not rigidly level. However, anything which might recall the rustic school of design must be carefully eschewed. Let the forms be simply decorous and well defined, of a material that will withstand the hand of time. Even on wooded and secluded slopes where the foliage is wild, an ordinary flagstone may be used with a low rise and deep tread.

The sloping balustrade as a parapet for steps is not invariably satisfactory. One of the simplest ways of replacing it is to carry out the side walls at the level of the top step, since a stairway always looks well between walls, especially when the latter are not carried higher than the upper ground level. There is no end to the usefulness in garden design of the simple feature of the stairway.

The garden shelter, under which heading may be loggias, garden houses, and *tempietti*, is a subject of the greatest importance to those who desire to make their garden really useful and to give it at the same time a complete and architectural finish. It seems almost unnecessary to speak of the usefulness of these shelters, if there were not a general reluctance to spend sufficient thought and money upon them. The loggia and veranda tempt us from the rooms of the house; the garden house persuades us to go farther and to walk as far as its shelter. Without these accessories the usefulness of the garden is impaired when, although weather conditions may be uninviting, the garden still is most attractive.

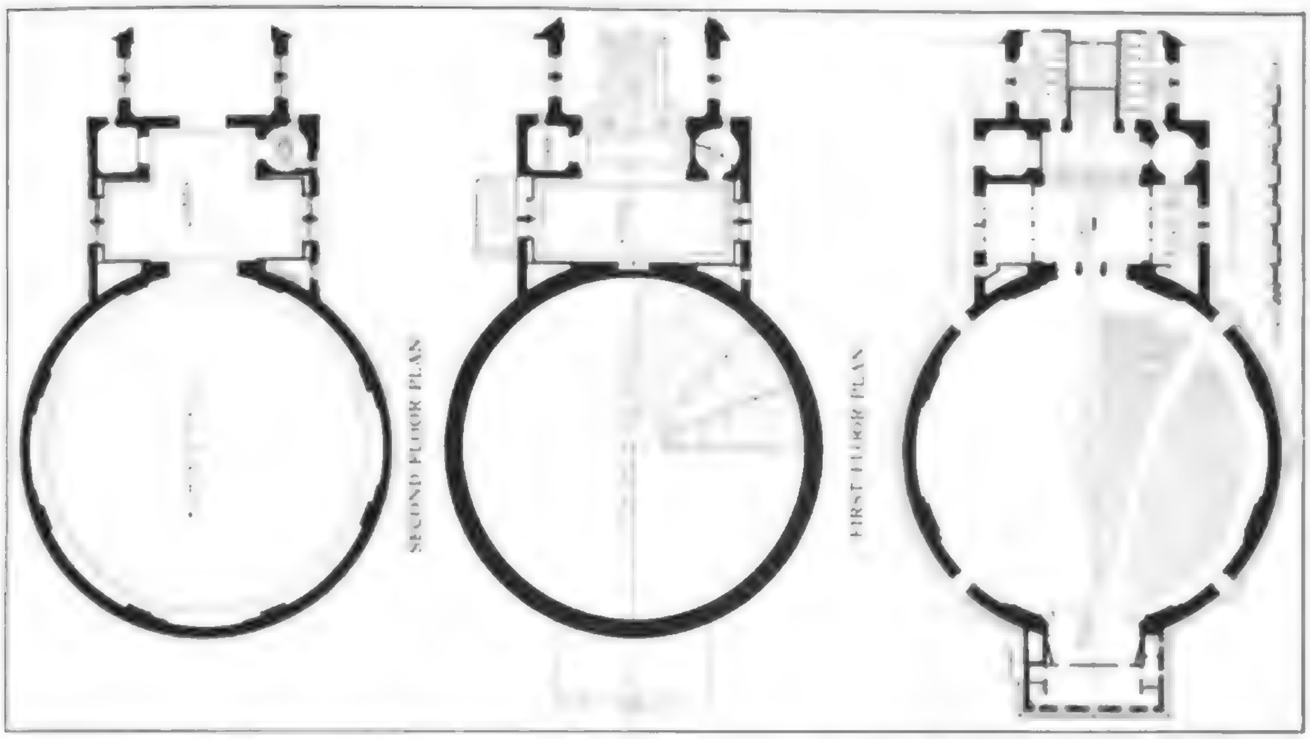
Nothing furnishes a garden better than a well designed summer house; it impresses one with the idea that the owner and his friends actually live here and enjoy the garden. It is part of the principle that the garden should be a product of man's own love of nature in carefully ordered effect. The veranda and loggia used in intimate conjunction with the house wed it to the garden.

The requirements of a garden house are few and simple, yet they are capable of wide diversity of treatment. From the timber buildings that come down from mediæval times to the quaint essays in miniature classical architecture there is a large choice to draw upon. The architects of the time of James I possessed the greatest felicity in this kind of work, the playfulness of Jacobean detail being quiet in modeling, while the mouldings and carvings are broad and even coarse. The close connection between these little structures and the garden walls is seen in numerous old examples, where the roofs of the former add a seeming stability to the brick and stone of the latter.

VIEW LOOKING INTO EXHIBIT HALL FROM FOYER

ADDITIONS TO THE UNIVERSITY MUSEUM, PHILADELPHIA, PA.

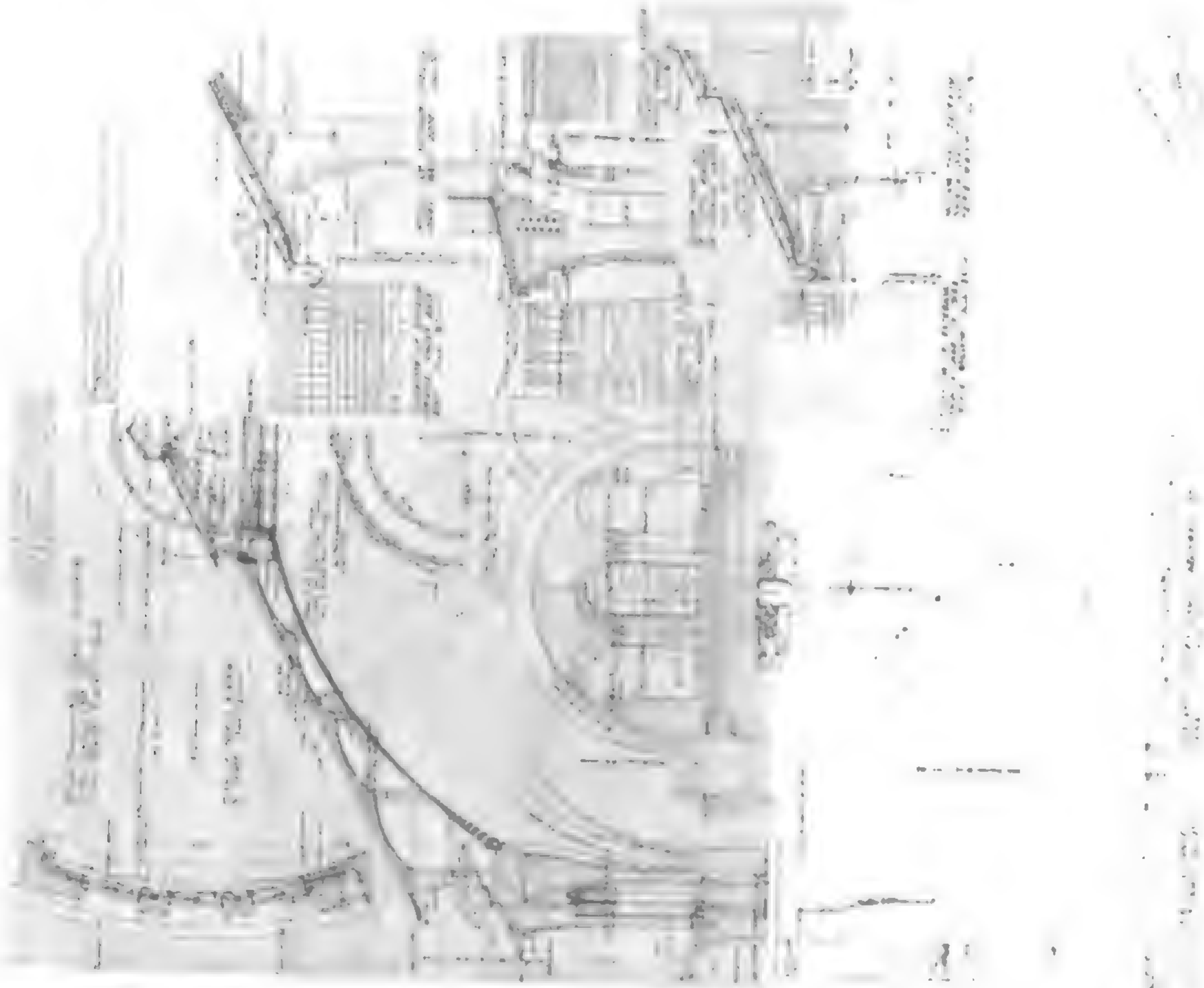
WILSON EYRE & McILVAINE, STEWARDSON & PAGE, DAY BROTHERS & KLAUDER
ASSOCIATED ARCHITECTS



GENERAL EXTERIOR VIEW

ADDITIONS TO THE UNIVERSITY MUSEUM, PHILADELPHIA, PA.

WILSON EYRE & McILVAINE, STEWARDSON & PAGE, DAY BROTHERS & KLAUDER
ASSOCIATED ARCHITECTS



DETAIL OF EXHIBIT HALL AND DOME

DETAIL OF EXHIBIT HALL

ADDITIONS TO THE UNIVERSITY MUSEUM, PHILADELPHIA, PA.

WILSON EYRE & McILVAINE, STEWARDSON & PAGE, DAY BROTHERS & KLAUDER
ASSOCIATED ARCHITECTS

VIEW OF AUDITORIUM LOOKING TOWARD STAGE

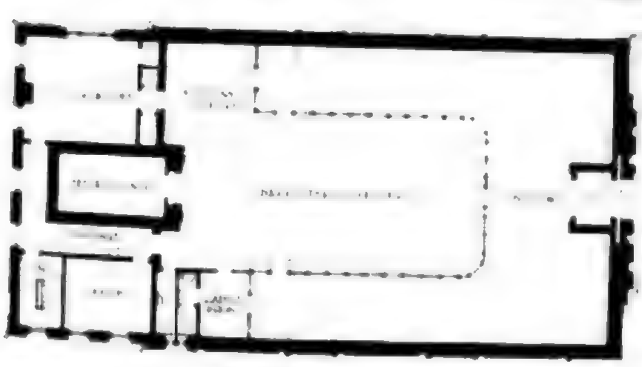
820·5

LONGITUDINAL SECTION ON MAIN AXIS

ADDITIONS TO THE UNIVERSITY MUSEUM, PHILADELPHIA, PA

WILSON EYRE & McILVAINE, STEWARDSON & PAGE, DAY BROTHERS & KLAUDER
ASSOCIATED ARCHITECTS


GENERAL EXTERIOR VIEW


FIRST FLOOR PLAN


BASEMENT FLOOR PLAN

NORTHAMPTON INSTITUTION FOR SAVINGS, NORTHAMPTON, MASS.

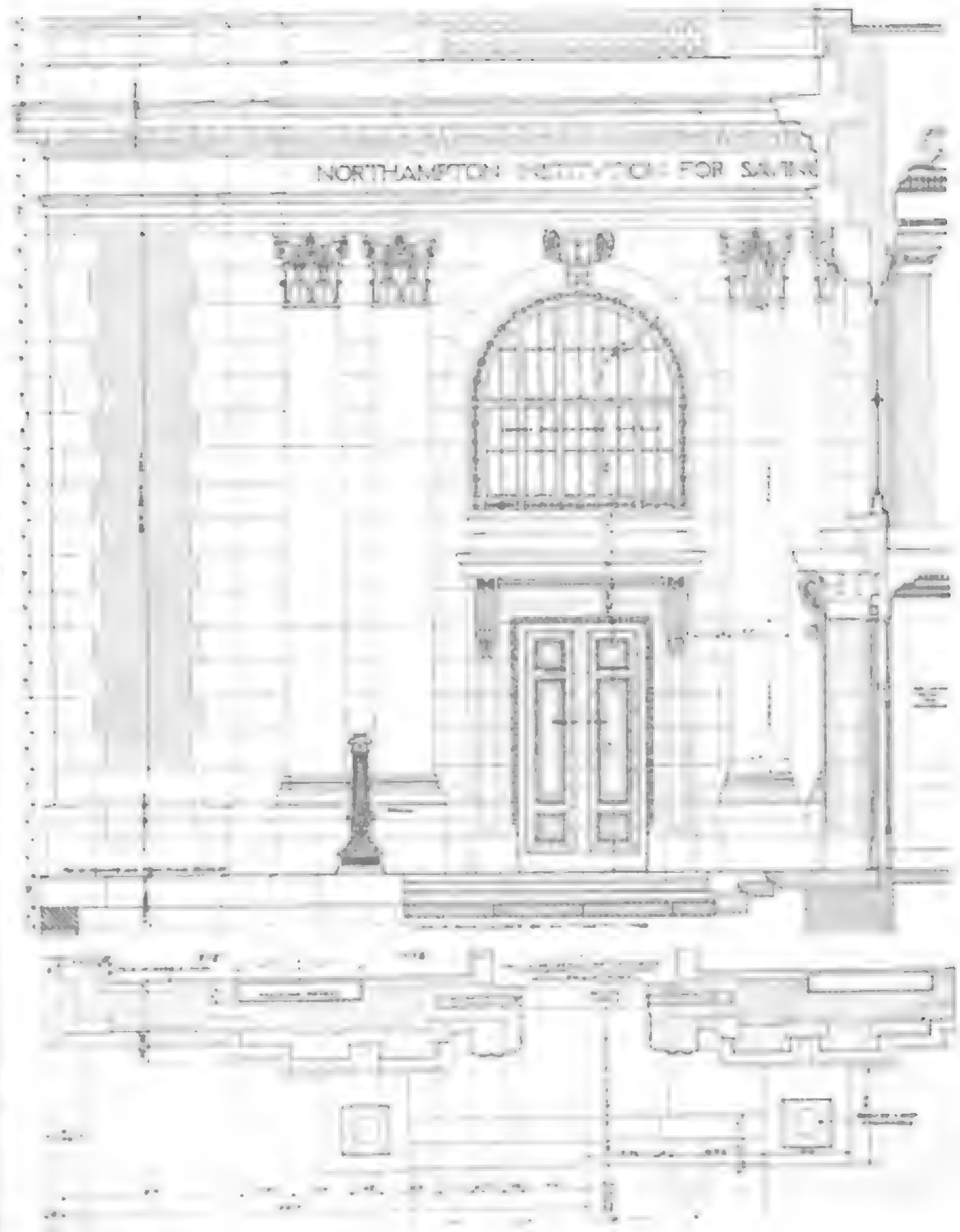
THOMAS M. JAMES, ARCHITECT

GENERAL VIEW OF PUBLIC SPACE

VIEW IN WORKING SPACE LOOKING TOWARD VAULT

NORTHAMPTON INSTITUTION FOR SAVINGS, NORTHAMPTON, MASS.

THOMAS M. JAMES, ARCHITECT



DETAILS OF FRONT ELEVATION

NORTHAMPTON INSTITUTION FOR SAVINGS, NORTHAMPTON, MASS.

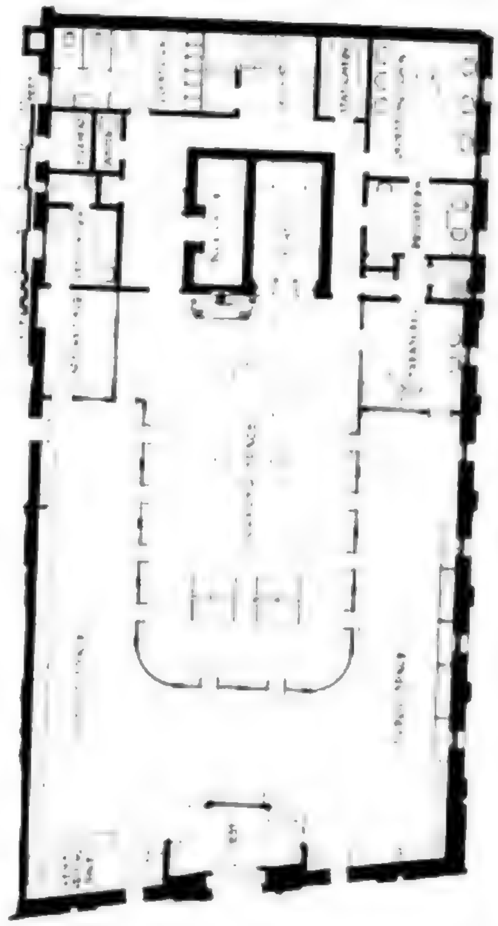
THOMAS M. JAMES, ARCHITECT

GENERAL VIEW OF EXTERIOR

FALL RIVER FIVE CENTS SAVINGS BANK, FALL RIVER, MASS.

WM. LUTHER MOWLL, ARCHITECT FOR HOGGSON BROS.

GENERAL VIEW OF BANKING ROOM



GROUND FLOOR PLAN

DETAIL OF ENTRANCE FRONT

FALL RIVER FIVE CENTS SAVINGS BANK, FALL RIVER, MASS.

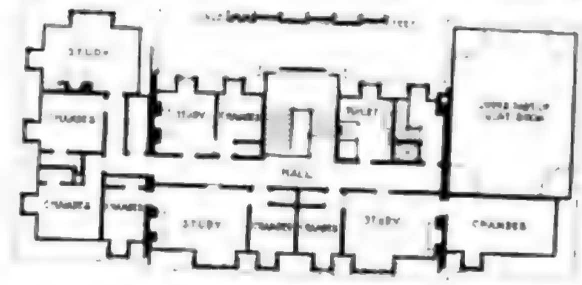
WM. LUTHER MOWLL, ARCHITECT FOR HOGGSON BROS.

GENERAL VIEW OF ENTRANCE FRONT

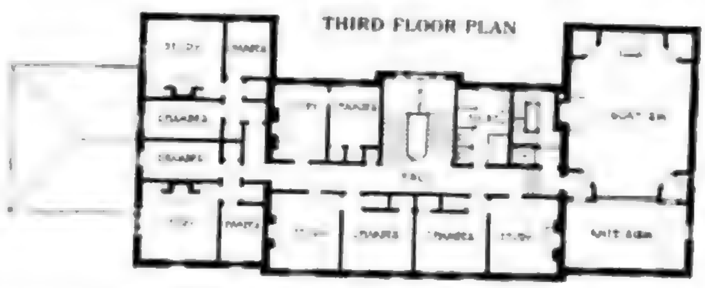
PSI UPSILON FRATERNITY HOUSE, AMHERST, MASS.

PUTNAM & COX, ARCHITECTS

RECEPTION HALL AND STAIRCASE

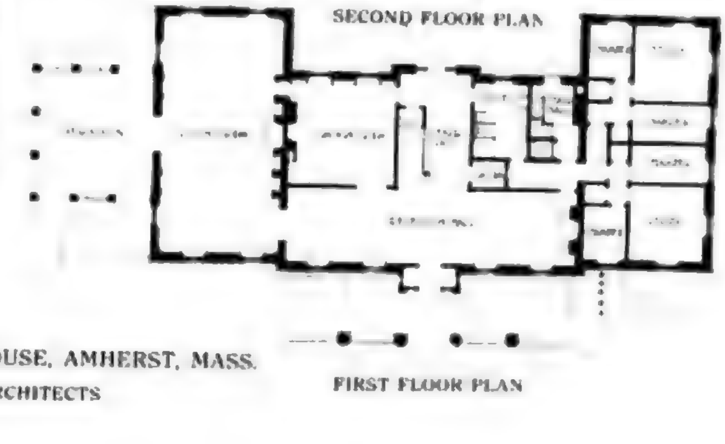


THIRD FLOOR PLAN



SECOND FLOOR PLAN

MANTEL IN SMOKING ROOM



PSI UPSILON FRATERNITY HOUSE, AMHERST, MASS.

PUTNAM & COX, ARCHITECTS

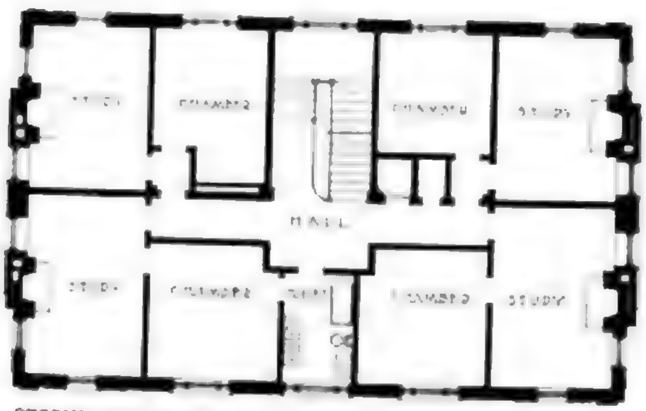
FIRST FLOOR PLAN

FRONT VIEW

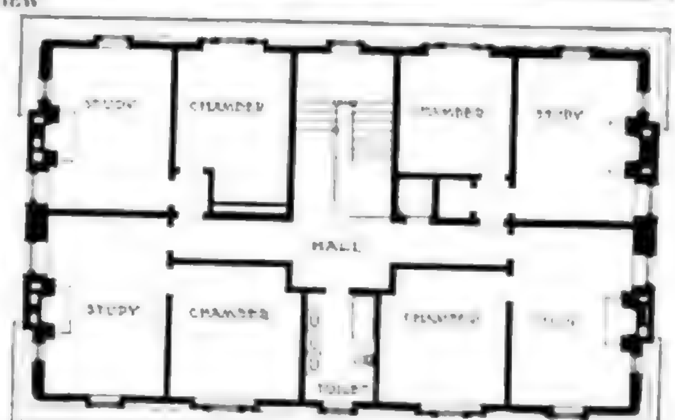
PHI DELTA THETA FRATERNITY HOUSE, AMHERST, MASS.

PUTNAM & COX, ARCHITECTS

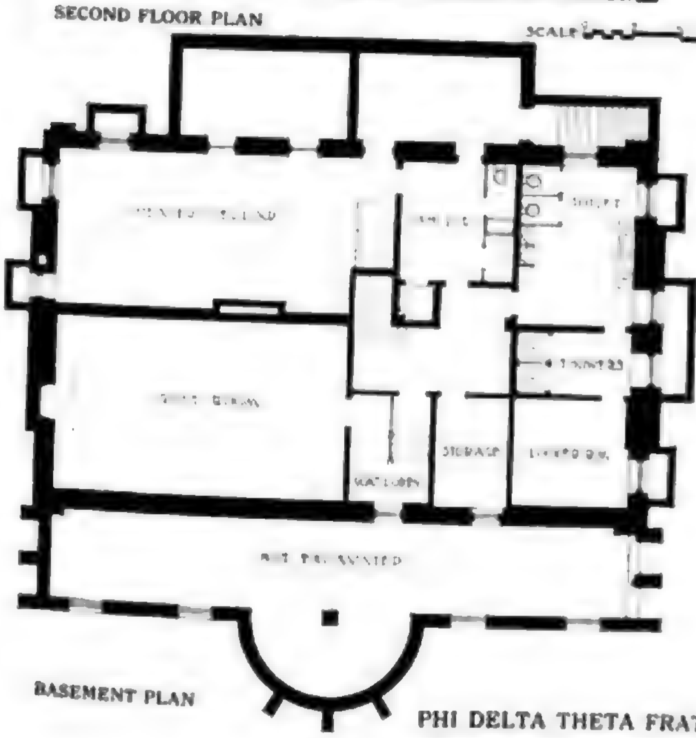
REAR VIEW



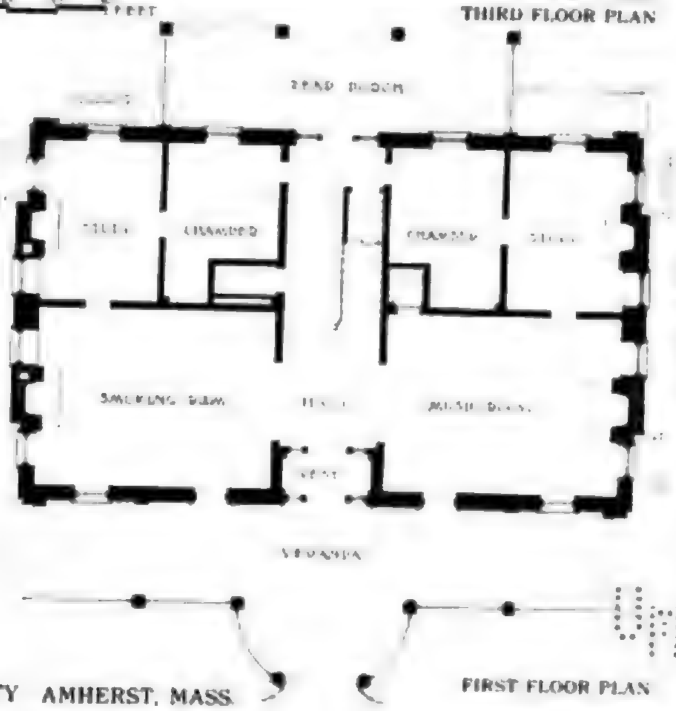
SECOND FLOOR PLAN



THIRD FLOOR PLAN



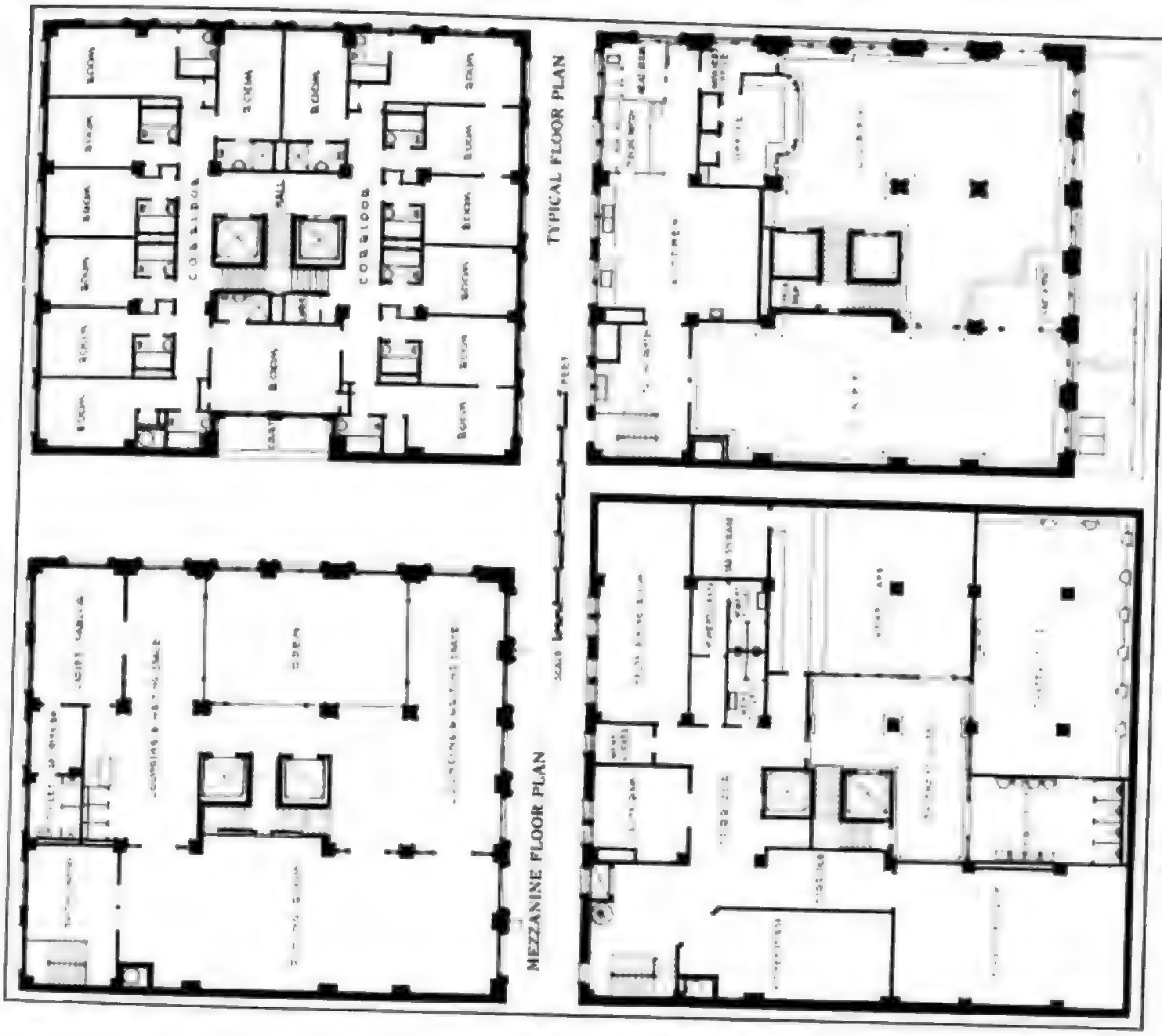
BASEMENT PLAN



FIRST FLOOR PLAN

PHI DELTA THETA FRATERNITY AMHERST, MASS.

PUTNAM & COX, ARCHITECTS



HOTEL WINECOFF, PEACHTREE STREET, ATLANTA, GA.

W. L. STODDART, ARCHITECT

GENERAL EXTERIOR VIEW

VIEW ON MEZZANINE FLOOR

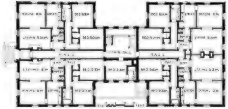
VIEW IN FIRST FLOOR CAFE

VIEW IN LOBBY LOOKING TOWARD OFFICE

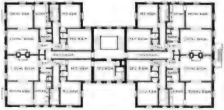
VIEW OF MEN'S CAFE IN BASEMENT

HOTEL WINECOFF, PEACHTREE STREET, ATLANTA, GA.

W. L. STODDART, ARCHITECT



FIRST FLOOR PLAN



SECOND AND THIRD FLOOR PLAN

ALLSTON APARTMENTS, CHARLES STREET, BALTIMORE, MD.
PARKER, THOMAS & RICE, ARCHITECTS

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS.

PLATE TWENTY-ONE.

"HOMEWOOD" is one of the best-known examples of early American or Georgian work in the South. Built in 1804 by Charles Carroll of Carrollton for his son at the time of his marriage, this fine old mansion stands to-day practically as it did over one hundred years ago. It is now a part of the Johns Hopkins University group, and has given the keynote for the design of the new buildings. "Homewood" has but a single story with very high ceilings, and this must be considered when one studies the scale of this doorway.

MAIN ENTRANCE TO "HOMEWOOD," BALTIMORE, MD.

Built in 1804.

MEASURED DRAWING ON FOLLOWING PAGE.

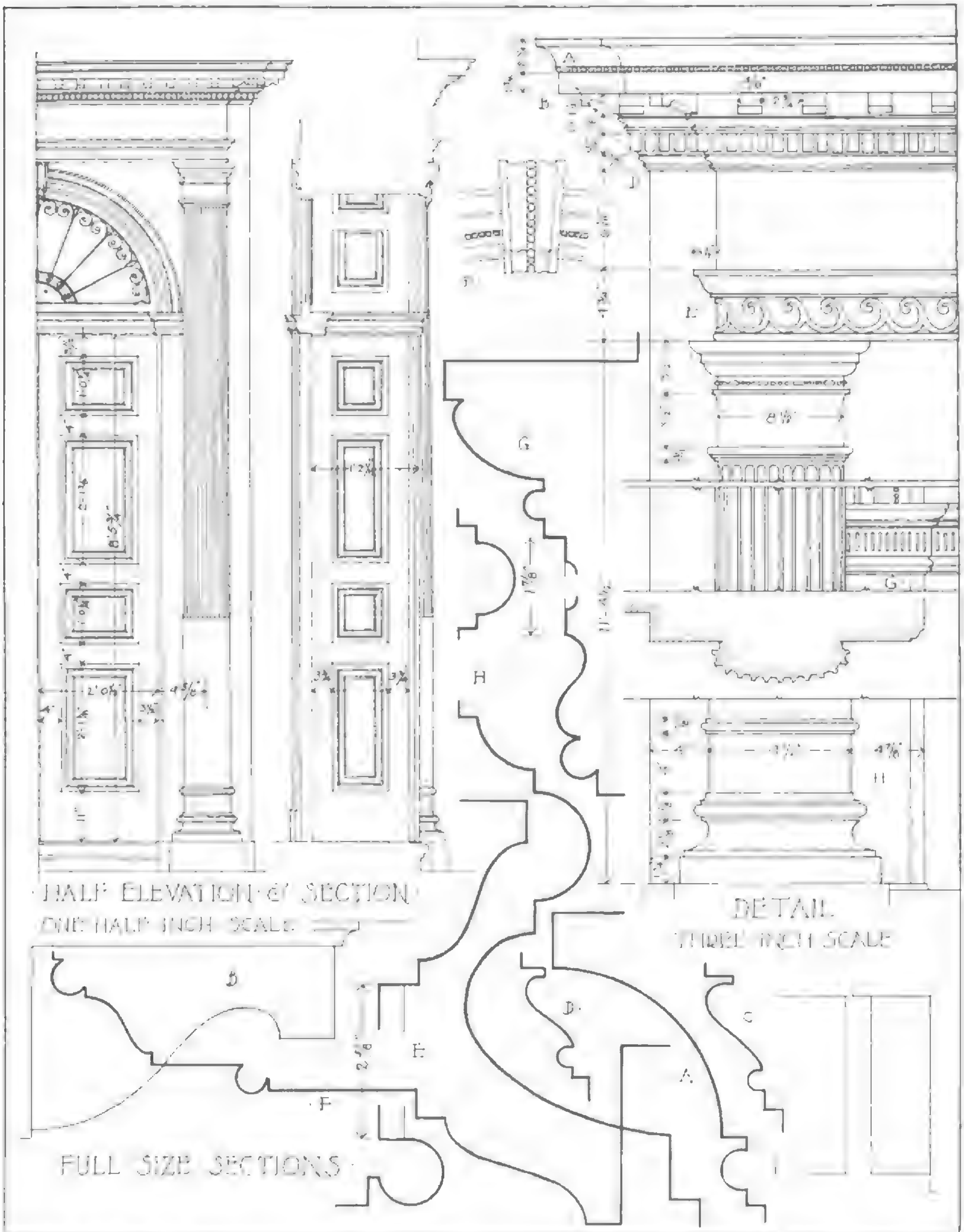


PLATE 21
MAY 1916

DOORWAY HOMEWOOD
BUILT [illegible] · BALTIMORE · MD ·

MEASURED & DRAWN BY [illegible]

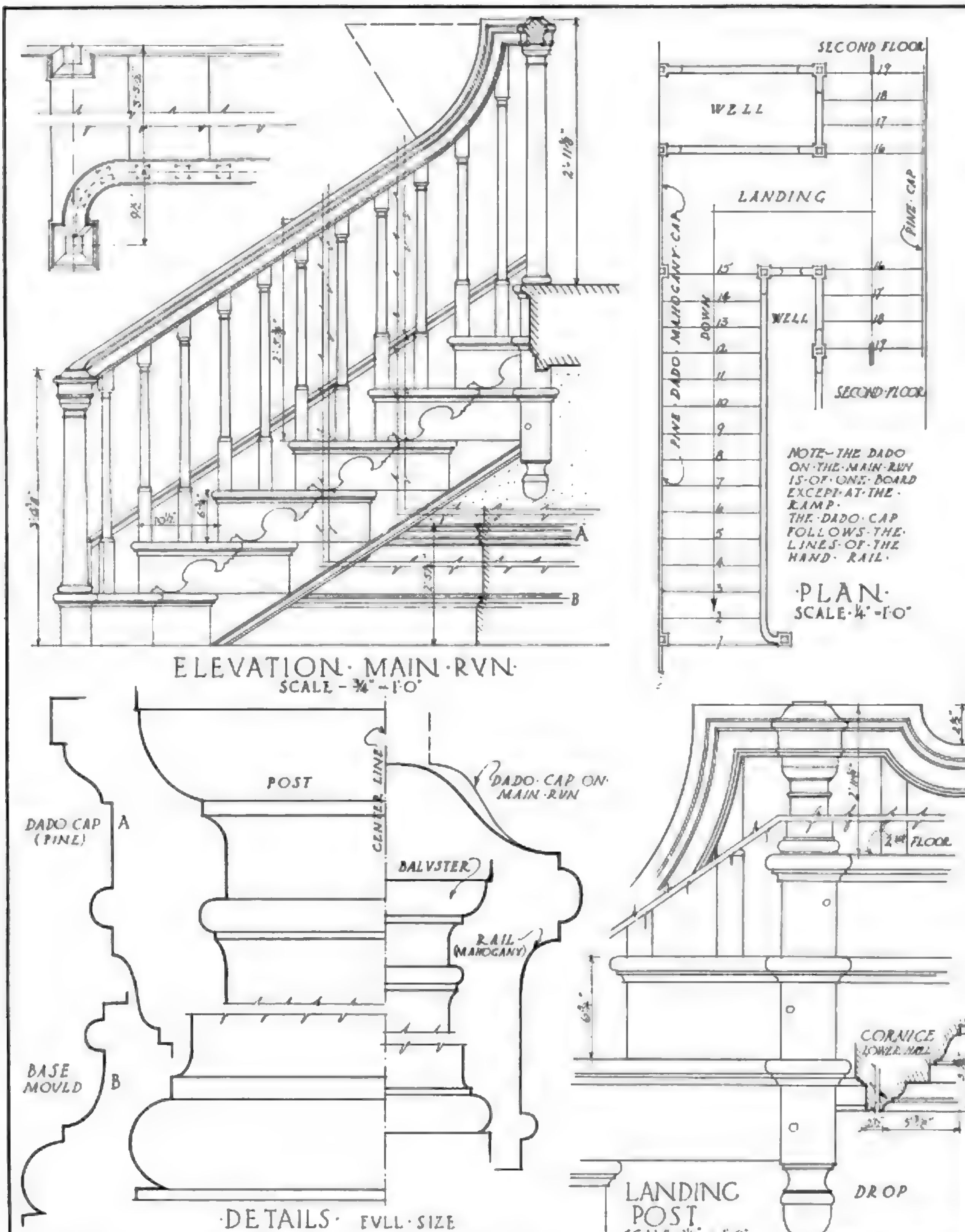


PLATE · 22 MAY · 1916	STAIRWAY · IN · JOHNSON · HOVSE DATE · ABOVT · 1760 NEWBVRYPORT · MASS ·	MEASVRED · & · DRAWN · BY · GORDON · ROBB ·

PLATE TWENTY-TWO.

THIS stairway is typical of many in the old square three-story houses of Newburyport. An unusual feature is the two short flights above the landing. It is severely simple, but excellent in its proportions.

The house has recently been demolished, but the stairway has been preserved and is being built into a house in Salem.

STAIRWAY IN JOHNSON HOUSE, NEWBURYPORT, MASS.

Built about 1760.

MEASURED DRAWING ON PRECEDING PAGE.

Old English Plaster Work.

By J. W. OVEREND.

THE sixteenth century was a glorious period in English craftsmanship, and many are the examples all over that country which tell of a day when men must have worked more for the love of the doing than the love of the getting. It was a time of great awakening in which designers began to appreciate that beauty could be expressed in the various kinds of commonly used building materials.

While it was especially a time of fine woodworking, expressed in the rich, silvery marked English oak, yet in a no smaller degree was the plaster work of the time less impressive and beautiful. During this period, in fact, all of the various crafts did at least something to perpetuate their memories, for they left behind them examples which hoary age has not affected adversely, but, on the contrary, made more beautiful.

In those days work was carried out under the direct supervision of a master craftsman, and such were the rigid rules and regulations in force that fines were inflicted on those who used bad materials or in any way cheapened the work; hence to-day, the quality of the work exists in the examples that remain as proof, which in some cases are glorious in the extreme.

Shakespeare lived in these times, and his comprehensive mind, observant of men and customs, did not fail to recognize the plasterer, for in one of his plays he speaks of plaster loam and rough cast; while in another he bursts out with the remark, "Would you desire lime and hair to speak better?"

The plaster work of that age was not merely confined to the interior, for many examples are external work of a beautiful, decorated description; the eastern side of the country, Norfolk and Suffolk, containing some of the best examples.

The interior work, especially the ceilings, cornices, friezes, etc., contains some extremely rich decorative work, which is to be particularly admired when one remembers that no "rag and stick" or fibrous work was done at that time, the whole being hand "wrot" plaster, worked into form from the scaffold boards. Even the skill in setting out the geometrical patterns is amazing. In quite a large number of these examples there seems to exist a definite relationship of design, especially in the patterns of the panel work, which would indicate that a few master craftsmen exerted a wide influence.

Many of the friezes are adorned with shields, festoons, and in some cases most grotesque figures of the human form, and it is a question whether the latter was done with the intention of carrying down to later centuries the history of the Elizabethan Age, or some story of local history and chivalry. Anyhow, the makers of the grotesque in plaster cannot be charged with the same motive that

Decorative Plaster on House Built about 1600, at Clare, Suffolk, England

the Norman church builders had in carving their grotesque gargoyles and corbels — that of revenge and spite which they expressed in stone and other materials.

The plaster age occurred at a time when many a historic English hall was built, and among some erected at that time may be mentioned Haddon; Chatsworth, in Derbyshire; Nettlecombe, in Somerset; Bampfyde House; Exeter; Devon; Hardwick, and many others, all of which contain more or less glorious examples of the plasterer's craft that convey to those who behold them an impression of excellence in design, finish, and workmanship.

In many of the halls mentioned one of the chief features is the plaster work of the chimney-pieces, but the most beautiful forms are seen in the scintillating effectiveness and richness of the ceilings.

The lower illustration on page 129 shows a ceiling in a building on High street, in the historic city of Exeter, Devonshire, in the southwest of England. The ceiling was done about 1600 and is a glorious mass of decorative design, the cornice and cove of the room being no less beautiful in their richness.

The other example illustrated is in the Custom House of Exeter. It gives an idea of the skilful craftsmanship of the plasterer of the period of 1600. The flowery ornamentation is delicate in the extreme, and the relation of the various outlines to each other is so perfect that the whole forms one unified and harmonious composition.

Painted Plaster Window Reveal in St. Nicholas Priory, Exeter

The illustration on this page shows an interesting piece of plaster work in St. Nicholas Priory, which is now being restored by the Exeter City Council. This plaster reveal which has recently been discovered during the course of the work displays a most fantastic design which had long been hidden by many coats of paint. The Peter Pan figure in the design would have puzzled even Mark Twain in giving it a correct name; while the second figure, blowing a blast of the horn, wears a headdress which must have been copied in some manner from a West Indian origin. What the significance of the decoration really is, only searchers through antiquarian records can reveal.

The illustration at the top of page 130 shows the ceiling in the priory mentioned above. The panels are composed of large, geometrical forms, and while not as richly decorated as the previous examples, this ceiling is still no less intricate in its workmanship when one considers the large surface covered.

Nettlecombe Hall, in Somerset, out in the country of the wild, red deer, is another very old historic place, built in the fifteenth century, and the seat of the Trevelyans. Besides containing a fine staircase there is an elaborate ceiling in the great hall, an illustration of which appears on page 130. An unusual feature in this ceiling, which is of a geometrical pattern, is the manner in which the members of the design are brought down to the terminal bosses.

A remarkable feature of Nettlecombe Hall is that it is well away from the center of any large industry, therefore during the time the ceiling was put up, the master plasterer and his men must have been drafted from a center to do the work and given living accommodations at the hall until their particular part of the work was finished.

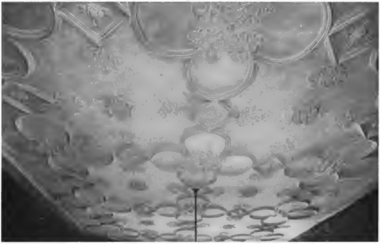
Bolling Hall, Bradford, Yorks, in the north of England, has a ceiling fully four hundred years old, with a remarkable ornamentation of dogs' heads, foxes, bears, etc., from the open mouths of which issue branches of fruit and other quaint and grotesque figures. The Bradford City Council has recently purchased the building and will no doubt preserve the plaster work.

The old order changeth, however, and transition has even taken place in decorative plaster work. The present-day moulded flowery designs are done at the fibrous works and put in place in various pieces at the building. Commercialism has affected very adversely the old and real craftsmanship; the craving at the present day is for the counterfeit, sufficient to serve present needs and requirements. It is not that many of the fibrous examples are any less delightful in their delicacy and beautiful finish than the older work, but will they stand the test of three or four centuries? and can the modern plasterer and designer hand down his examples to the future to attract and captivate the lovers of the beautiful in the days that are to come? The answer to the first is, Time alone will tell; while the second answer is, To those who would build and design,

Build, so that ye dare to trust
For honest fame the jury time empanels,
And leave to truth each noble name
Which glorifies your annals.

PLASTER CEILING IN CUSTOM HOUSE, EXETER, ENGLAND
ERECTED ABOUT 1600

PLASTER CEILING IN DRAPER'S SHOP, HIGH STREET, EXETER, ENGLAND
ERECTED ABOUT 1600



PLASTER CEILING IN ST. NICHOLAS PRIORY, EXETER, ENGLAND

PLASTER CEILING IN NETTLECOMBE HALL, SOMERSET, ENGLAND
ERECTED ABOUT 1600

Competition for Design of New York State Architects' Certificates.

THE New York State Board for the Registration of Architects has recently conducted a competition among architects, draftsmen, and other designers, resident or working in New York State, to obtain a design for an Architect's Certificate. The regents of the University of the State of New York are to issue such certificates by authority of the above mentioned board to all persons who are entitled to practise architecture in the State of New York, and the interest in the problem manifested by the architects of New York, therefore, was considerable.

THE VNIVERSITY OF THE STATE OF NEW YORK
BE IT KNOWN THAT
MARCVS VETRVVIVS POLLIO
HAS GIVEN SATISFACTORY EVIDENCE THAT HE HAS THE
QVALIFICATIONS REQVIRED BY LAW AND IS HEREBY AVTHORIZED
TO EMPLOY IN THE STATE OF NEW YORK THE TITLE OF
·ARCHITECT·
STATE BOARD FOR THE REGISTRATION OF ARCHITECTS
IN WITNESS
WHEREOF THE
REGENTS GRANT
THIS CERTIFICATE
NVMBER MCCXI
VNDER SEAL OF
THE VNIVERSITY

First Prize Design
Austin Whittlesey, Designer, New York City

THE·VNIVERSITY·OF·THE·STATE·OF·NEW·YORK
BE IT KNOWN THAT
HAS·GIVEN·SATISFACTORY·EVIDENCE·THAT·HE·HAS·THE·QVALIFICATIONS
REQVIRED·BY·LAW·AND·IS·HEREBY·AVTHORIZED·TO·EMPLOY·IN·THE
STATE·OF·NEW·YORK·THE·TITLE·OF
ARCHITECT
STATE·BOARD·FOR·THE·REGISTRATION·OF·ARCHITECTS

Second Prize Design
Robert Pallesen, Designer, New York City

The drawings reproduced herewith are those awarded prizes and honorable mentions. Cash prizes of $200, $150, $100, and $50 were given to the designs placed first, second, third, and fourth, respectively.

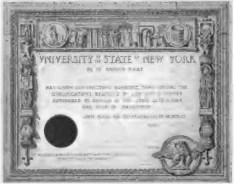
The designs were of a general high order of merit and are indicative of the artistic value which may be attached to even so simple a thing as a certificate when careful, constructive thought is given to its design and arrangement.

In originating their designs, the competitors were allowed great freedom in the choice of style, the only condition bearing upon the design being the wording of the text and its arrangement which were to follow the form given in the program. There was, accordingly, wide diversity shown in the treatment that the different designers accorded the certificate. Nearly all were based upon the use of architectural forms or ornament for their decoration, though some confined the treatment to simple arrangements of lettering.

The reproduction of the design selected for the certificate will be from an engraved steel plate printed on parchment, and most of the designers succeeded in imparting the characteristic quality of steel engraving to their designs. The size of the certificate is to be 8 by 10 inches, and the reproductions shown here are therefore slightly larger than one-third of the actual size.

The drawings were judged in New York by a jury composed of the following architects: William R. Mead, New York; George Carey, Buffalo; Frank H. Quinby, Brooklyn; Henry Bacon, New York; Charles A. Platt, New York; J. Foster Warner, Rochester; and S. B. P. Trowbridge, New York.

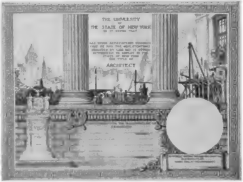
The Registration Act, which became a law a year ago, requires all persons residing in or having a place of business in the state for the practice of architecture, and who were not so engaged before the adoption of the act, to secure a certificate of qualification before they may use the title "Architect." Examinations of candidates are held under the supervision of the regents of the State University by a board of examiners composed of architects of experience and high professional standing.



VNIVERSITY OF THE STATE OF NEW YORK

BE IT KNOWN THAT

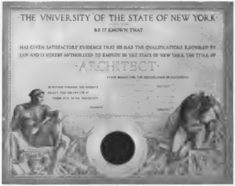
THIRD PRIZE DESIGN
AT LEFT
ROBERT W. HUBEL
DESIGNER
NEW YORK CITY



THE UNIVERSITY
OF
THE STATE OF NEW YORK

ARCHITECT

HONORABLE MENTION
DESIGN AT RIGHT
ALBERT M. KIRCHBAUM
DESIGNER
NEW YORK CITY



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·ARCHITECT·

STATE BOARD FOR THE REGISTRATION OF ARCHITECTS

FOURTH PRIZE DESIGN
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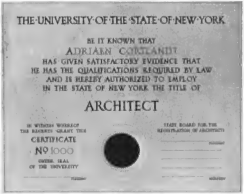

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PLATE DESCRIPTION.

Additions to the University Museum, Philadelphia, Pa. Plates 65–68. The additions to the University Museum provide an auditorium and a large exhibition hall. The exterior is faced with selected red stretcher brick and roofed with glazed tile to correspond with the portions of the building previously built.

The auditorium on the lower floor is lined with a porous tile to aid the acoustic properties. The ceiling is also of tile construction with ornamental faience panels. The heating of this room is accomplished by the admission of air under the seats, and the vitiated air is exhausted by fans through openings in the ceiling.

The main exhibit hall has windows in the upper walls and a skylight. The walls are faced with brick of a warm gray color and the dome is of tile. The room is artificially lighted solely by lights placed above the diffusing sash under the skylight.

Northampton Institution for Savings, Northampton, Mass. Plates 69–71. The Northampton Institution for Savings is a one-story structure of fireproof construction devoted entirely to banking purposes. The main banking room occupies the entire height of the front portion of the building and the offices and trustees' room occupy the rear, which has a mezzanine story.

The exterior of the building is of waterstruck brick, laid in Flemish bond with trimmings of Indiana limestone. The base course is granite. The main entrance doors, the lamp standards on either side, and the window frames throughout are bronze.

The main banking room is wainscoted in Tavernelle rose marble to the height of approximately eight feet, while the floor is of rectangular marble tiles of meadow gray Tennessee. The die of the bank screen, including the counter top, is of the same marble as the base and the screen itself is solid bronze. The walls of the room are divided into panels by fluted Doric pilasters, the panels being relieved by ornamental plaster panel mouldings. The cornice and ornamental beam treatment are of plaster, the walls and ceiling being painted to harmonize with the marble and the bronze fittings. Natural light is had from large ceiling lights above and from windows on the front and side elevations. The lighting fixtures are of lantern type in bronze to match the counter screen.

The vault is directly opposite the entrance, and the side toward the banking room is enriched by a doorway treatment surmounted by an ornamental clock. This treatment balances that of the entrance vestibule.

The building is absolutely fireproof with reinforced concrete floor and roof slabs on steel framing. The heating and ventilating equipment is very complete, including an air filtration and washing device.

Fall River Five Cents Savings Bank, Fall River, Mass. Plates 72, 73. The Fall River Five Cents Savings Bank has foundation walls of ledge stone, which was blasted from the site. The basement contains storage vaults and heating apparatus. The site was large enough to permit the erection of two store and office buildings, one on each street. In order to insure the individuality of the bank, these buildings were made of different colored brick.

The base of the façade is of white granite. The upper course of the base, the pilasters up to and including the neck moulding, and the lettered portion of the frieze are of white marble. The remainder of the white portion of the exterior is of terra cotta, with a sponged and sprayed texture surface.

The body of the wall is of rough textured brick with deep raked joints. These joints were formed and the brick protected during construction by a novel scheme. Wooden strips forming an angle were used, one member of which was placed against the course just laid and the top horizontal member placed on the top of the same course, entering the joint to just the depth to which the mortar was to be laid. When this course was finished the strips were raised for the next course. This prevented the mortar from getting on the face of the brick, necessitating very little cleaning at the completion of the job and eliminating raking entirely.

The bronze entrance doors are in two folds, which in their open position during business hours form bronze jambs with the inner or day doors. The main windows have electric welded fixture sash, with mullions built up to overcome the thin effect of ordinary factory sash.

The public portion of the banking room has a marble mosaic floor with marble border. There is a marble dado to the height of the screen, which is marble and bronze. The plain panels of the wall were covered with felt to overcome reverberations incident to the solid masonry construction and the form of the room. The working space is covered with linoleum.

Hotel Winecoff, Atlanta, Ga. Plates 78, 79. This hotel is located at the corner of Ellis and Peachtree streets, one of the highest points in Atlanta. It contains two hundred rooms, each with private bath.

It is of fireproof steel construction, the three lower stories being faced with terra cotta finished to resemble Georgia granite, the main body of the walls with brick, and the upper stories with faience terra cotta.

The mechanical equipment is modern in every respect. There are two traction worm gear type elevators and a freight sidewalk lift. The basement contains ice and refrigerating plants, vacuum cleaning machinery, and ventilating apparatus. There is no power plant, all current being taken from outside.

Allston Apartments, Baltimore, Md. Plate 80. These apartments, on North Charles street, Baltimore, Md., are situated directly opposite the new group of buildings of Johns Hopkins University. For this reason the keynote of the architectural treatment has been found in the well known Carroll Mansion "Homewood," which has been incorporated in the new University group and which has determined the style and architectural treatment of all the new University buildings.

The exterior is of Colonial brick, with trimmings of white woodwork and marble. In plan, the building takes the shape of the letter "I" with courts at either side. Four housekeeping apartments are provided on each floor, with the main stairway and lobby at the center. Each apartment contains living room, dining room, pantry, kitchen, two bedrooms, and bath, with servants' rooms and baths in the basement, where the janitor's living quarters and storage rooms are also located.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IN the conduct of his professional duties the architect is called upon to exercise an important part in the selection of materials which enter into the construction of the buildings he designs. In this part of his work he has been enabled in recent years to depend upon the manufacturers of high grade building materials for full and competent service in explaining the details of their products and the best method of using them. The conscientious manufacturer to-day expends every effort to make his product as good as possible so that the architect, in specifying it and depending upon it to properly express his designs, may have no opportunity for dissatisfaction. The architectural profession has not been lax in recognizing the value of such co-operation or in encouraging every effort made to improve the business methods of building operations.

Reputable manufacturers have made serious efforts to earn the co-operation of architects and to receive their recognition of well made materials. In this connection there has been for a long time considerable discussion of the practice of including the phrase "or equal" in architects' specifications and more or less agitation among manufacturers to have its use abandoned. It has been consistently retained, however, for various reasons, one being a prevalent impression, whether founded on fact or not, that the manufacturer whose product was exclusively specified would ask a higher price than if he were in direct competition. This is a condition which it is easy to imagine might result from the abandonment of the clause, but which is not and has not been contemplated, we are sure, by any high grade manufacturer. His ground has been, because of the study he has given his product and the merit he has proved it to possess, that an architect, after satisfying himself of its quality and its suitability, should specify it without any reference to the phrase "or equal," of which unscrupulous contractors or middlemen may take advantage to furnish something which is obviously not of equal quality, but whose inferiority many times is difficult to prove. He has claimed this as a mark of recognition and approval for having the courage to make a quality product that in the face of severe competition can be sold at a reasonable price; but to have his claim fully considered, the manufacturer, on his part, must give evidence that the confidence of the architect will not be abused.

While it is generally expected that architects will have a working knowledge of the usual building products and their relative merits, it is nevertheless beyond their power and resources to maintain testing laboratories, etc., where quality may be accurately determined.

The architect must therefore rely, to a large extent, upon the claims of the manufacturers where he has good reason to accept them as truthful statements until such time as he has had opportunities to actually know from the experience of using a product just what its merit is. Every opportunity the manufacturers afford the architect for an impartial consideration of their materials should therefore be received with interest, for it lessens the architect's effort in arriving at a just estimate. An opportunity of this nature, which certain leading manufacturers have recently afforded to prove that they desire and will respect the architect's confidence, is an improvement in merchandising methods which it is claimed will remove the serious objections to a more definite stand on the part of the architect in specifying. This is the standard or fixed price policy of selling, whereby the price at which a given building material can be bought in the open market is determined and maintained under all conditions. These prices may be obtained by any architect desiring them, and they will remain in force until market conditions or manufacturing costs necessitate a change, when a new price will be made and announced to all interested parties.

The adoption of this system by more manufacturers should place the merchandising of building materials on a high plane and provide the architect with a fair means of judging the relative merits of different products. With the knowledge of the quality of given products and their market prices the architect will be able to judge each fairly and, when necessary, determine to a reasonably correct degree just what product is the equal of another.

Le Brun Traveling Scholarship —Preliminary Notice.

THE third bi-annual competition for the Le Brun Traveling Scholarship, founded by Pierre L. Le Brun, will be held in the summer of 1916. It is open to any architect, a citizen and resident of the United States, between twenty-three and thirty years of age, and who is not, nor has been, the beneficiary of any other traveling scholarship, and who has had at least three years' experience as draftsman or practising architect. The amount is $1,000, the period of the scholarship not less than six months.

Each competitor must be nominated by a member of the New York Chapter, A. I. A., who shall certify in writing that the above conditions are fulfilled by the nominee, and that in his opinion the nominee is deserving of the scholarship.

All persons who are eligible and desire to compete are requested to send their application to the undersigned before July 15, 1916. Applications must be accompanied by a statement of residence, citizenship, age, experience, and general qualifications, and by the necessary nomination and certification from a member of the New York Chapter, A. I. A. Those not having the acquaintance of a member of the Chapter may avail themselves of the services of any well known architect who can vouch for them to a member of the New York Chapter, with whom he is acquainted.

Architects throughout the country are requested to bring this notice to the attention of their eligible draftsmen.

BERTRAM G. GOODHUE,
2 West 47th Street, New York City,
Chairman, Committee on Le Brun Traveling Scholarship

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

JUNE, 1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS

GIULIANO DA SAN GALLO

BORN IN FLORENCE, 1445. DIED 1516. ARCHITECT OF PALACE OF SAN PIETRO, VINCOLI; GATE OF SAN MARCO, PISA; CHURCH OF THE MADONNA DELLE CARCERI, PRATO, AND THE SACRISTY OF SANTO SPIRITO, FLORENCE

THE BRICKBVILDER

VOLUME XXV JUNE, 1916 NUMBER 6

The Planning of Trade and Industrial School Buildings.

By LEWIS GUSTAFSON.

Superintendent of The David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.

I. GENERAL CONSIDERATIONS OF THE PLAN.

THE facilities provided for manual training in the high schools of this country have, thanks to the thoughtful and skilful labors of such architects as Mr. Ittner of St. Louis and Mr. Snyder of New York, been brought to a high degree of perfection. The general plan for manual training has been worked out. It is admirably adapted to its purpose. Further improvement would seem possible only in matters of minor detail.

Another type of education, however, has been growing up in this country alongside manual training during the past ten years for which the conventional manual training provision has been found wholly inadequate — a type of education demanding a building all its own. This new type goes by the name of industrial or vocational education. It is my purpose in this article to explain this new education and to set forth some of its architectural requirements. I must of necessity write non-technically as a layman with no architectural presumptions, but with several years of experience as "owner" or tenant. Perhaps the best way to open the explanation is to show wherein manual training and industrial education differ.

Manual training has grown up in our schools as an adjunct to general education. It had its origin in the recognition of the fact that boys have bodies as well as minds; that the only way to educate some boys is to give them something to do with their hands; that the best way to educate any boy is to get him to use hand and brain and eye together for at least part of the time. It had for its slogan, "Send the whole boy to school!"

As an adjunct to general education, it has been given a place quite supplementary to book learning. In the elementary schools it has been limited in most places to two or three hours a week in the seventh and eighth grades, and in the high schools to three or four hours a week during the four years. In the elementary school it has run largely to benchwork in wood with some woodturning. The product has been mostly pen trays, coat hangers, bird houses, etc. — all small things. In the high schools the curriculum has covered woodwork (including woodturning and patternmaking), forging, moulding, and machine-shop practice. The product has run to dumbbells, Indian clubs, Morris chairs, small gasoline engines, and other things of like nature.

As an adjunct to general education it has concerned itself with general principles; it has endeavored to train hand and eye and mind together; to impart information regarding fundamental principles of science and construction; to train the æsthetic sense through the making of beautiful things in wood and metal. It has not been directly concerned in fitting boys to earn their living, though frequently boys have put to industrial use the drafting and shop skill and knowledge of tools and of construction learned in manual training classes.

As an adjunct to general education, manual training has been awarded space in the school buildings proportionate to its weight in the general scheme. In elementary schools this space has frequently been confined to one or at the most two rooms, little, if any, larger than the ordinary class room. The space in high schools has been more generous, but still small, in proportion to the whole. The Soldan High School in St. Louis, for example, built to accommodate 1,600 pupils, contains a total of ninety-two rooms. Of these only five are shops. These comprise a woodworking room, 30 feet 6 inches by 65 feet; a woodturning room, 30 feet 6 inches by 80 feet; a machine shop, 30 by 69 feet; a forge room, 30 by 60 feet; a moulding room, 25 by 38 feet, with necessary stock, preparation and motor rooms, instructors' offices, etc., taking up possibly 16,500 square feet of floor area — considerably less than one-tenth of the floor area of the entire building.

These figures are given with no thought of disparagement. Manual training is an admirable thing and will always be needed. The Soldan High School is one of the best high schools in the country not only as to building, but as to instruction and management. The manual training course is only one of ten excellent parallel courses offered in the school, and the space allowed is ample for the purpose intended, although the school has an enrolment considerably in excess of the 1,600 for whom it was originally planned. These figures from this school are given solely to present more sharply the contrast between manual training and the new education, and to emphasize more strongly the need for a different style of building for the latter.

The establishment of industrial education finds its justification in the increasing difficulty this country experiences in obtaining skilled artisans and competent foremen and superintendents. How serious this difficulty is in the building trades, and how rapidly it is becoming more

serious, every architect knows to his exasperation if not to his sorrow. The situation is equally serious in the machine trades and in all other occupations requiring a combination of manual skill and technical knowledge. The decline of the old apprentice system, the growing complication in manufacturing and building processes, with the accompanying minute subdivision of labor, the almost total cessation of skilled artisan immigration, in some cases the restriction of apprentices by labor organizations and in others the unwillingness of employers to bother with beginners, have all combined to bring about this scarcity and to urge the establishment of some means of training workers outside of the occupations themselves — in other words, the establishment of schools different from those giving manual training for general or cultural ends, whose purpose shall be not general education, but education closely linked to the industries; whose graduates may go directly into the industries equipped not only to earn their living there, but to contribute a share of the skill and industrial intelligence which the industries need for their further development.

These schools have begun to appear and are destined to appear in rapidly increasing numbers. They take several forms, for boys and for girls, ranging from the high school with a slightly increased manual training content, still somewhat subordinated to the general curriculum, through the industrial or vocational high school, to the very definite, closely specialized, closely limited trade school. It is with the latter and with those that approach the latter in their seriousness as preparatory schools for the industries rather than as preparatory schools for the universities or for that vaguer thing which school teachers are inclined to call "after life," that this discussion has to deal. The schools chosen as examples to be discussed in these papers by no means exhaust the list of even those most prominent in the field of such instruction; they are selected as prominent institutions whose buildings are new enough and similar enough in their main characteristics to reflect a recent and definite tendency in design and construction. Engineering schools and technical institutes of collegiate rank have purposely been omitted as training for professional rather than artisan life. Two of the schools to be considered, the Worcester Boys' Trade School and the Milwaukee Public School of Trades for Boys, are maintained by public taxes as part of the public school system of their respective cities. The others are operated as philanthropies on liberal private endowments.

Whatever their source of income, the general scheme of instruction is the same in all. They all teach shopwork, drafting, and mathematics, and most of them teach applied science. These items in the curriculum are based on the fundamental needs of the mechanic. Shopwork is given first and foremost, that he may know how to handle his tools with skill; drafting, that he may know how to read the drawings and blueprints that embody his working directions, and on occasion, as foreman or jobber, make simple working drawings himself; mathematics, that he may know how to figure out dimensions, loads, quantities, prices, etc.; and applied science, that he may understand the mechanical principles involved in his trade and be acquainted in a simple way with the physical and chemical characteristics of his materials and know how to combat those forces, like rust and rot, that cause his materials to deteriorate.

Shops. Of these items the shopwork is by far the most important, since no amount of technical knowledge can compensate for any lack of ability on the part of the artisan to perform the manual side of his work with skill and dispatch, and because, incidentally, in the very acquirement of this manual skill the artisan with brains cannot fail to absorb a good deal of technical knowledge. This makes the shop and the shop accommodations the basic consideration upon which the whole building should be planned.

To be real and to instruct properly, the work in the shop must resemble as closely as possible the work in the trade itself. This means that the shop must be a trade shop, and not merely a shop in a school. It must, above all, be large enough for the work in hand and must be equipped with proper tools for the manufacture of the product, and be provided with proper facilities for bringing in and storing material and for routing the product in the process of making. If it is a machine shop, it must be equipped with real machines such as a modern factory would use. These must be full size, capable of turning out full-size work, large and small, similar to that turned out in any general jobbing shop. If it is a shop for carpentry or bricklaying, it must be ample in length and breadth and height to allow for the erection of entire buildings and parts of buildings built to full size. If it is a foundry, it must be a real foundry, capable of turning out sizable castings of commercial value.

Moreover, the shop must be large enough to allow for the storage of these full-size articles between shop periods. Where the articles are light and small, they can be placed in a bench drawer or in a storeroom. Where they are bulky and heavy or cannot be disturbed — as in certain kinds of machine or foundry work, or in carpentry or bricklaying or tinning or housewiring or plumbing — the things being made must be left as they are from period to period, and any other pupils using the shop must work around them.

Even where the shop is large enough for these requirements it will accommodate only a few students as judged by manual training standards. In the ordinary manual training school the pupil spends most of his time at general studies and only about four hours a week at the most in the manual training department. Given a thirty-hour school week, a manual training shop built to house twenty at one time will have a maximum capacity in one week of at least seven different classes of twenty, or 140. In the trade school, on the contrary, each student must be in the shop at least half of each day. If each student is in the shop half of each day, only two classes can be accommodated in each shop in the week. If the classes are limited to twenty (which is the maximum number one teacher can direct efficiently), forty students is the maximum in a given week for the same space utilizable in manual training for 140. If each student is in the shop more than half of each day, then the capacity of that shop dwindles accordingly.

It is for these reasons that the carpentry shop in the Ranken School, St. Louis, is 47 by 96 feet, with a ceiling 32 feet high over part of it; in Wentworth Institute, Boston, the foundry is two stories high, with a working space 48

by 72 feet, and in the Milwaukee School the machine shop is 46 by 116 feet, and that even these sizes seem sometimes inadequate.

Drafting and Mathematics Rooms. The accommodations for drafting and for mathematics, on the other hand, need vary little or not at all from those provided for this purpose in any good manual training high school. Adequate lighting (preferably from the north) should, of course, be insisted upon; likewise adequate provision for blueprinting by electricity and for teaching pupils to operate the blueprint machine. Separate drafting rooms should be provided for architectural and for machine drafting. In planning these, it must be borne in mind that the school drafting classes will constantly be making drawings and blueprints for use in the shops, since the shops are constantly making new and practical things. Liberal closet room should be provided for storage of materials and drawings, and, if possible, a good sized industrial museum or exhibit room, where pupils may study in connection with their drafting, working models, parts of machines, sections of buildings, and samples of all sorts of materials. The Königliche Vereinigten Maschinenbauschulen at Cologne has three drafting rooms, 25 feet wide and respectively 45, 40, and 45 feet long, placed end to end along one side of the building, and flanking these throughout their length such a museum 36 feet wide and 135 feet long. Doors open from these drafting rooms immediately into the museum as into a corridor (which the museum replaces), so that an instructor can bring his class directly to the object to be drawn or to the piece of mechanism which he is explaining. The arrangement is worth imitating.

Applied Science Laboratories. When one comes to the consideration of facilities for applied science, the departure from conventional high school arrangements is again radical, and again the demand is for space. The ordinary high school course in science is rather abstract. The apparatus is usually small, though often elaborate and finely finished. The object is the understanding of principles, with only occasionally — and in some schools never — the application of these principles to industrial uses. In the trade school, however, the primary object is to teach the application of these principles to industrial purposes and to explain the scientific principles underlying the shop and trade processes. It touches the industries all the time. Without this practical application the study has no purpose.

This involves the introduction of shop materials and industrial apparatus rather than small laboratory equipment, and the trade school laboratory must be large enough to accommodate them. For example, students in the building and machine trades need not only to understand the principles, but to become familiar with the actual operation, of block and tackle, the builders' derrick, the contractors' force pump, the gas and gasoline engine, etc., and for this combined theory and practice they need if not the larger size, at least a workable commercial size in these things. To become familiar with the strength of materials they must have commercial testing machines of large capacity. To learn the chemical characteristics they must have laboratory equipment and space suitable for analysis of paints, oils, fuels, metals, and so on.

In short, just as the shops in a trade school resemble the shops in a factory, so the science rooms should resemble the testing laboratories in a manufacturing plant, with such adaptations as have been evolved for convenience in teaching, like the placing of a lecture room, equipped with lantern, between the room used for chemistry and that used for mechanics, etc. The engineering colleges can furnish valuable suggestions in this regard. Because of the heavy nature of much of the apparatus and of the material and machines to be studied and tested, it may be advisable, both for stability and accessibility, to place the science department on the ground floor, though heavy construction and freight elevators may make this location unnecessary.

Ceiling heights in shops and laboratories must be determined by the nature of the work and by the requirements of light and air.

Other Facilities. Of the other facilities for a trade or industrial school, little need be said. The experienced architect confronted with the problem of combining school and factory will be able to work out his own solution. The school authorities in each case should be in a position to indicate in general what direction the courses are designed to take: how many pupils it is the desire to accommodate; how much of the time is to be devoted to shopwork and how much to science, drafting, and mathematics, and to other subjects, if any, and these considerations will determine the proportions of space. The amount of money available for building and the amount available for running the school will determine what must be omitted or deferred. Every school must have adequate class rooms, locker rooms, toilet rooms, and administrative offices, in addition to drafting rooms and shops. It is highly desirable that every school also have a library, a gymnasium, a lunch room, and at least one lecture hall capable of accommodating the entire student body at one time. This hall should be fitted for a stereopticon and moving-picture machine. Unless larger gatherings are to be held frequently, the erection of a large auditorium for state occasions is likely to prove a needless expenditure of money and space. Such a room is too apt to be idle a great part of the time. For commencements and other large occasions the gymnasium, already in almost daily use, is ordinarily quite sufficient.

Whether the school shall have its own power plant or purchase its power from outside, is a matter for local decision. Most trade and industrial schools find it advisable to include such a plant both as a practical operating steam and electrical laboratory and as a means of teaching the steam engineers' trade.

Elevators in such a school are usually not needed except for freight. Freight elevators should, of course, be placed advantageously for general access and use.

Architectural Treatment. The finish and looks of such a building may be left to individual taste and means. So far as the instruction is concerned, it can make no essential difference whether in outward appearance such a school resembles a school or a factory, whether it is built of expensive or inexpensive materials. If a monumental effect is desired, it is quite legitimate to have it. Some of the newer, more attractive factory buildings are quite fine enough for any school.

Whether the interior finish in the offices and class rooms and main corridors shall be of Italian marble or Caen

stone or hard plaster or good red brick, is again immaterial from the standpoint of instruction. Common sense will dictate that places subject to much soiling shall be of material easily cleaned with a damp cloth, and that walls and corners in shops and in corridors adjacent, which are always liable to bruises and scars from the carrying of lumber and long iron pipe, and the running of wheelbarrows and trucks, shall be of material sufficiently hard to stand such abuse. Here again the example of what is done in the factory furnishes the cue.

Flexibility. What is of supreme importance for the architect to realize and to remember is that this trade and industrial education is a comparatively new thing; that it is in its experimental stages; that it is developing very rapidly; that no one can forecast accurately how it will eventuate or even what the needs of any one institution or any one department in a given institution will be ten years from now, and that mistakes in concrete and brick and stone, or even the correct present adaptation of stone and brick and concrete, may prove very costly to the proper workings of a school at the end of that time.

The watchword, then, must be "flexibility," and the example of the loft "to be subdivided to suit tenant" must be kept ever forward. The permanent interior bearing wall should be shunned. Large interior spaces with plenty of light and air, broken up by partitions of three and four inch hollow tile, easily removable without disturbing the main structure, and free, as nearly as possible, from ventilating flues, pipes, conduits, and other permanent things, furnish the key to flexibility. This flexibility is needed in the design of the shops and the science rooms especially. It is not so necessary in the design of the purely school part of the building.

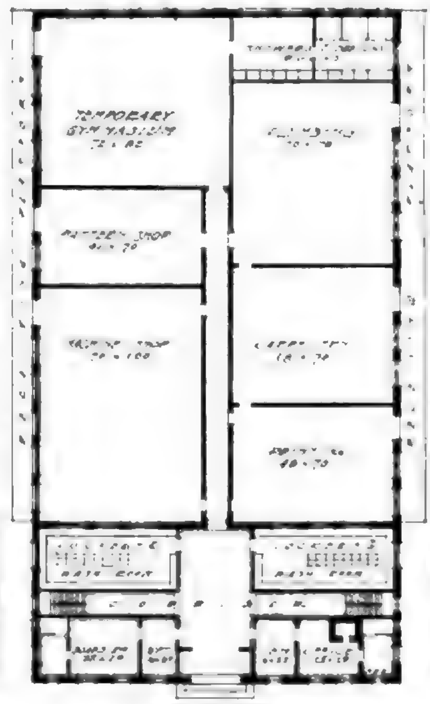
The Central Unit. In all of the school buildings to be considered in detail in a second paper, there will be noted a similarity in one respect — that each school has a central combined administrative and class-room unit. In some cases this is in a separate central building, in others it is in a centrally located part of the general building. This portion usually houses the offices, class rooms, drafting rooms, library, assembly hall, etc., and the main stairs. These are sufficiently defined to require little or no change in the future. Here the architect may safely follow good high school practice. In locating the office, care should be exercised to make it easily accessible not only from all parts of the school, but also from the street, so that it may be easily found by strangers. There is much to be said for the practice of having only one general entrance, through which all students as well as all visitors must pass on entering or leaving the building. Such an entrance lends itself to ease of supervision, which in the case of trade and industrial schools (whose pupils are usually of high school age) is a much more serious matter than in colleges. If other exits are required by law, — and they are, of course, desirable anyway, — they can be made to open into the school court.

Connecting Corridors. It is also a general practice where more than one building exists to have the units connected by covered corridors. This is of great value, not only in helping to keep track of the students' whereabouts, but in avoiding exposure to inclement weather on the part of students and teachers in passing from one part of the institution to another. Should the building be three stories high, the placing of these connecting corridors on the middle floor will be found a great convenience and a great saving in stair climbing.

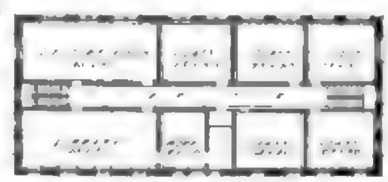
The Block Plan. The block plan will, of course, present no serious difficulties to the architect. It differs in no essential from the block plan of any factory or hospital or other institution where size, light, air, and covered connecting corridors are desiderate.

In the scheme marked X the writer has endeavored to present in its simplest form a working out of the general principles here enunciated. It will be noted that the expansion of the one-story, skylighted shop wing is limited only by the size of the ground available; that the shops are easily accessible from the main building; that locker and wash rooms are conveniently located with reference both to the shops and to the main building; that the office is centrally located and easily found; that the class rooms are ample, and that proper drafting and museum and assembly space is provided. The boiler room and the science department have been omitted. These could be substituted for the gymnasium or given space in a well lighted basement.

Second Floor Plan



First Floor Plan

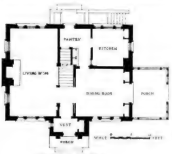


Third Floor Plan

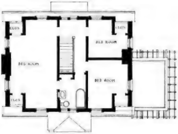
Scheme X Simple Trade School Plan, Embodying Convenient and Efficient Arrangement of Space

Recent Houses at Forest Hills Gardens, Long Island

FROM THE WORK OF GROSVENOR ATTERBURY, ARCHITECT, AND EUGENE SCHOEN, ARCHITECT



FIRST FLOOR PLAN



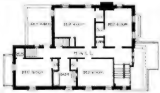
SECOND FLOOR PLAN

HOUSE OF MISS TAYLOR, FOREST HILLS GARDENS, LONG ISLAND, N. Y.

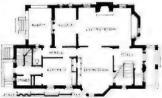
GROSVENOR ATTERBURY, ARCHITECT

GENERAL VIEW FROM STREET

DETAIL OF FRONT



SECOND FLOOR PLAN



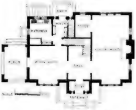
FIRST FLOOR PLAN

HOUSE OF E. G. TROWBRIDGE, ESQ., FOREST HILLS GARDENS, LONG ISLAND, N. Y.

GROSVENOR ATTERBURY, ARCHITECT

GENERAL VIEW FROM STREET

SECOND FLOOR PLAN



FIRST FLOOR PLAN

VIEW FROM SIDE

HOUSE OF J. A. MEEKER, ESQ., FOREST HILLS GARDENS, LONG ISLAND, N. Y.
GROSVENOR ATTERBURY, ARCHITECT

VIEW OF SIDE FROM STREET

HOUSE OF DR. THOMAS C. CHALMERS, FOREST HILLS GARDENS, LONG ISLAND, N. Y.

EUGENE SCHOEN, ARCHITECT

Modern Practice in the Design of Bank Vaults.

II. THE REQUIREMENTS OF SMALL BANKS.

By FREDERICK S. HOLMES.

NO single problem in the entire field of vault design is more difficult of satisfactory solution than that of the country bank vault. The attempted answers, as evidenced by work installed, run from no vault at all, or merely a safe and too frequently a poor one at that, to vault construction so expensive as to appear unwarranted.

How much money a bank in the country or in a small city is justified in spending for the protection of such of its funds and securities, and the collateral of its customers, as it must keep on the premises, and how this expense should be distributed, is the question. This can only be settled after a careful consideration of many factors, including the character of the bank building, its immediate environment, the size of the town or city, character of the community, possibility of burglary or mob attack, and other similar conditions, a comprehensive digest of which will decide whether the outfit should include a vault, a safe, electric protection, watchman or burglar insurance, or all, and what should be the proportionate cost of each.

Many institutions depend almost wholly upon burglar insurance, many others upon insurance plus electric protection, the addition of which materially reduces the insurance premium. Others add a fairly good safe, although of course all have some sort of enclosed storage space usually dignified by that name, which is often a misnomer. The good safe still further cuts the insurance rate. A majority of country banks, however, have vaults varying in strength from an ordinary brick enclosure without a lining, and fitted with the cheapest kind of so-called fire-proof doors, up to really good construction.

A practice unfortunately becoming too common is the use of showy bolt work, crane hinges, and pressure mechanism set upon ordinary cement filled, fire-proof doors to produce the impression that such doors are really burglar proof. The public has no way of judging the strength of any safe or vault except by its outward appearance, and it is questionable advertising to dress a fire-proof vault to appear as one of burglar-proof construction.

Unfortunately for the peace of mind of the banker, who must limit his expenditure for safe and vault construction, the element of resistance against which he must build is identical with that which menaces the urban banker; for fire burns as hotly in the country as it does in the city, and the expert burglar will not confine his attentions to the largest banks. The same appliances and the same skill in their use may be brought to bear equally in any part of the country, and while the amount of moneys carried by the smaller and more remote institutions is not so attractive as that carried in the great vaults of the cities, yet the opportunities for attack and successful get-away are far greater, and this condition should not be lost sight of.

The accompanying outline plan and section are suggested as representing a good type of fairly low cost, effective construction. The metal lining should be approximately 2 inches in thickness, built up of layers of various materials combining qualities resistant to shock, tearing effects of explosives and tools, cutting and drilling instruments, and to the oxy-acetylene cutter-burner. This lining should be surrounded, without air space, by a rod or rail reinforced concrete wall poured monolithically. This wall, in turn, should be covered on all six sides with the panels of an electric protection equipment, either central office or isolated alarm system, this in turn protected by an exterior finish, either of steel panels, marble, removable plaster sections, or wood, as may be determined by the architect.

The entrance should be protected by a single straight flange door approximately 18 inches in thickness, having carefully ground joints and built up of composite construction, including a face casting carrying reinforced concrete and anti-cutter-burner section, and inner sections corresponding in principle to the general make-up of the lining, but very much heavier. These thicknesses may be reduced if the cost is prohibitive, although such a reduction is not desirable.

The vault should be set in such position as to permit free observation of all sides, top and bottom, and also to provide access to the electric protection panel work for inspection or repairs. An open foundation is the best, although, because of the difficulty of successfully attacking a vault from the bottom, the use of an enclosed foundation as a fire-proof vault is not particularly objectionable.

Fire-proof vaults are frequently built alongside of and abutting security vaults, which is unwise practice because of the ease with which the fire-proof vault may be entered and the cover afforded for burglarious operations. Lowering platforms or tilting floor sections are not necessary if the splay of the bottom jamb is reduced to a minimum, in which case an incline foot-plate may be installed even where trucks are to be rolled into the vaults, as the rise need not be more than 2 inches in 2 feet. The floor in front of the vault at the front edge of the foot-plate should be recessed to permit the plate to sink in flush. A substantial day gate is always desirable, which should be provided with a latch lock to be opened with a key from either side. The use of an inside knob for unlocking robs the gate of practically all of its security.

The accompanying drawings show an installation of safe deposit boxes in addition to the bank's lockers and this practice cannot be too highly recommended. The revenue from even a small lot of boxes goes far toward paying the interest upon the cost of the vault. In addition to the convenience afforded the bank's customers and the advertising secured by bringing the vault work to the attention of the public, it is also a valuable factor in establishing closer relations between the bank and its customers.

The safe deposit boxes should be ample in size and the unit width should be not less than 5½ inches. This provides a double unit box of sufficient width to store securities laid crosswise, and the recently adopted outside depth of 26 inches — 2 inches greater than the older standard

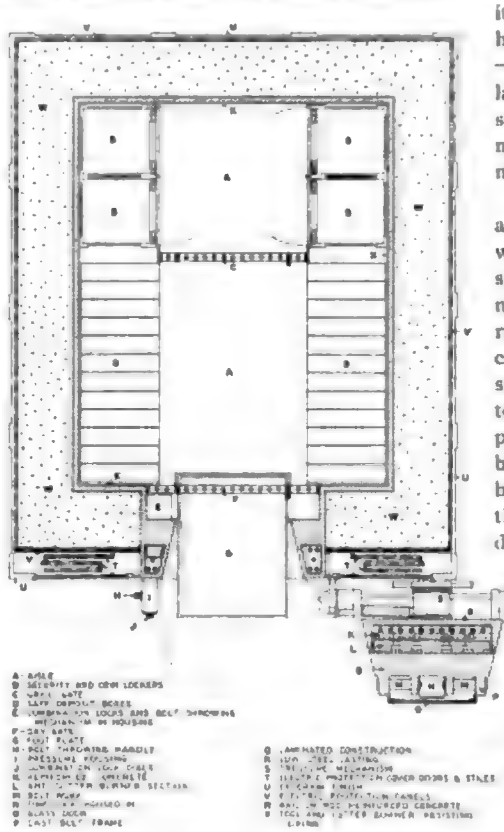
— is appreciated by box renters as it provides room for two lengths of securities in the tin box with a space in front for jewelry, etc.

It is a mistake to economize in connection with the safe deposit boxes by using cheap key locks. The lock has always been the weakest point in the safe deposit business, and the highest grade of interchangeable key locks should be selected mainly for their intrinsic value and partly for the advertising which they furnish.

It is customary to divide by grille work the sections of the vault which are used by the public and by the bank, and this is always to be advised. The construction of the bank lockers as shown is an improvement over the older designs in that the door opening is the full size of the interior of the locker, there being no return angle frames. This is not only a matter of convenience where loose storage is concerned, but permits the use of the entire closet where filing devices are used.

Small vaults are seldom provided with electric call buttons, but their use is recommended for obvious reasons. Floor tile of any character can be used, but cork has proven particularly satisfactory except for very large public vaults where a more dignified material is to be preferred.

Electric protection has been mentioned and is shown on the drawing as a part of the equipment. In explanation it may be stated positively that no vault can be built to-day, at a cost not prohibitive to the country bank, which will withstand an up-to-date burglarious attack of a day's duration. Consequently, some dependence must be placed upon other factors, and electric protection is one.



Plan of Typical Bank Vault of Effective Construction and Moderate Cost

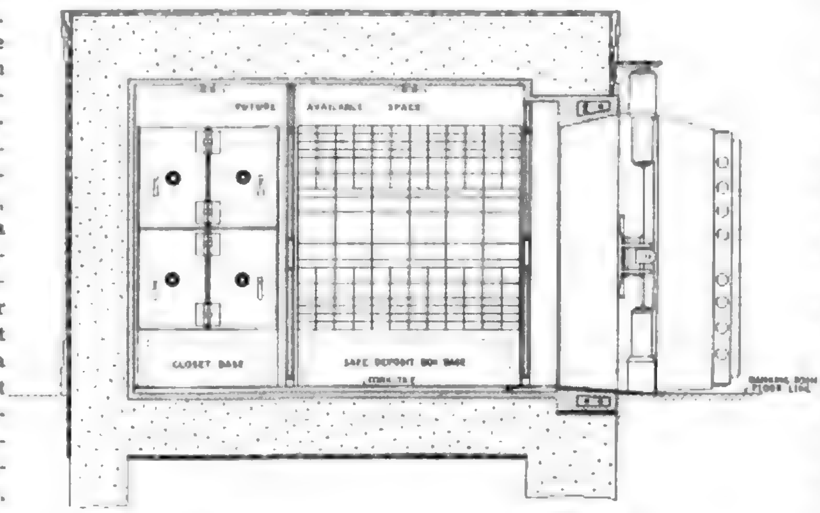
There are several different systems in operation, not all of equal value, and expert and unbiased opinion should be had before making a selection. These statements must not be taken as a corroboration of the position so frequently advocated by salesmen of electric protection outfits, that a protective installation in connection with fire-proof walls is all that is really necessary. All arguments in support of such a stand are fallacious, although often accepted by banks, as is evidenced by the existing great number of protected fire-proof vaults used for bank and safe deposit purposes. In the last analysis, electric protection means simply a watchman, and full reliance must not be placed upon it. All banks should have some form of mechanical and structural protection. Electric protection is by no means infallible, although it is generally so represented. It has weak points like other human productions. Even if it were perfect, there is naturally nothing about it which provides a physical stop to a burglar or mob and it would be quite practicable in many cases to ignore this protection, enter the vault, and make a get-away before the watchmen or public summoned by the alarm could interfere, to say nothing of the often proved possibility of standing off such interference with firearms and so extending the time for operating.

Electric protection performs one service, however, that makes it a necessary adjunct even to the very strongest vaults. It effectually protects against the unauthorized entering of the vault, out of business hours, by the officers or employees of the bank who may know the combinations of the locks and be in a position to trick the time locks or to see that they are not wound or are underwound at closing time, and, indeed, that is the only reason why it is in use on many of the heaviest vaults in the country —vaults that are more than burglar proof, that were built to resist organized mobs with all the machinery that they could command.

Lighting the vault would seem a simple matter and one that would ordinarily call for no special thought, but, as with most similar subjects, there are right and wrong ways. The location of the lighting fixtures should be studied with reference to the interior equipment, especially if filing devices are to be used. They should usually be of low design, to lie close to the ceiling and permit the locker doors to be as high as possible and clear the fixtures in their swing; also to allow safe deposit boxes to run as near to the ceiling as practicable. Vault space is valuable, even that near the top which should be made conveniently available. It goes without saying that the light should be plentiful, soft, and evenly distributed. Where more than one circuit is used, fixtures should be so wired that the blowing of a fuse would not put out all of the lights in any fixture. If the vault is large or more than one story in height, and this statement refers to large fire-proof as well as to security vaults, continuous-burning night-lights are necessary to permit any one accidentally locked in to find the telephone and to assist those outside in effecting his release. It is sometimes desirable to install a low tension system of lighting, which would automatically be thrown on if the high tension system should be put out of commission, so that the vault would at no time be dark. The common method of carrying the current into the vault by means of a flexible cord with plug connection is not to be recommended; it is inconvenient, the door is often closed upon the cord and a fuse is blown, a delay is generally experienced in getting new cords, and it is a positive source of danger in connection with a large safe deposit vault where unauthorized interference would put the vault in darkness.

Properly installed and permanently located, lead covered wires may be built through the vault construction from the bottom upward without affecting its security. A switch may be located at a convenient point on the front of the vestibule; if the vault is large, this should be a momentary contact button with a pilot light, the button actuating an automatic switch.

Too frequently an architect is so limited by the bank's appropriation for the building that work even approximating the character above indicated is out of the question and he is constrained to build a fire-proof vault and allow the bank to buy a so-called burglar-proof safe and place it inside the vault. This is quite common practice, but it cannot be too strongly condemned. No safe that would be purchased under such conditions is sufficiently strong to withstand burglarious attack for any considerable length of time, and to enclose it in a fire-proof vault is simply to furnish protection to the burglar while he operates, not only giving him a concealed space, but also providing an effectual noise-proof chamber, which will eliminate, or at least deaden, the sound of explosions.



Longitudinal Section through Typical Bank Vault

It is preferable to use a burglar-resisting safe, enclosed in a heavy, fire-proof covering, and located in such a position as to be seen conveniently from the street. This safe should be set up from the floor so that the watchmen, police, and public could see under it, and mirrors should be provided and so arranged that the sides, back, and top can also be readily observed. This in conjunction with proper lighting effects and an electric protection cabinet is inexpensive and effective.

Some banks in carrying out this scheme have gone so far as to place their safe in the front window close to the sidewalk, and as even the ordinary safe requires an appreciable amount of time for a successful attack, the chances for detection are so great as to act as a deterrent, if not an actual guarantee, against any attempt.

Architects should caution their clients, however, against purchasing the ordinary commercial safe if it is to be used for protecting any large amount of money or securities, and should recommend one specially built upon plans drawn by a competent and unprejudiced designer in the interest of the bank.

A word regarding fire-proof vaults. These are too frequently built of walls so thin that they will not withstand shock of falling bodies, although they may be fully fire-proof aside from this factor. Walls of hard burned brick set in rich cement mortar are satisfactory provided, of course, that the roof supporting beams are fully protected. Concrete, either with or without reinforcement, except that the top should always be strengthened, are more common and are to be depended upon.

A wide choice is to be had from manufacturers' designs in the selection of doors. Where the fire risk is slight, outside single and inside folding doors of thin construction may serve; but if there is a possibility of any considerable fire, they should not be depended upon. A cement filled door, 6 or 8 inches in thickness, should be used Such doors have the advantage of requiring no inside doors and so conserve both space and convenience. Furthermore, if the vault is located in the basement and there is a water risk, door frames may be grouted solidly to the vault walls and the door joints packed with compressible water-proof packing, against which the door can be forced with a pressure handle; this will provide a water-proof vault, a quality which is lacking in the great majority of fire-proof vaults.

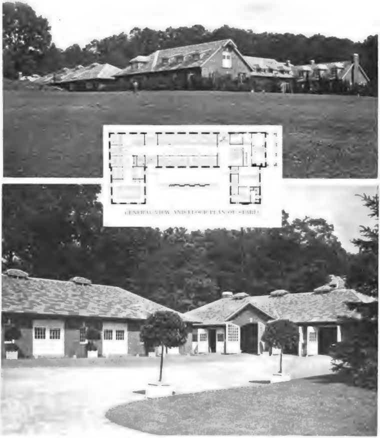
The largest and strongest vaults in the United States and Canada have been built from engineers' designs, while comparatively few of the smaller vaults have received such specialized attention, though every argument favoring the employment of an engineer upon heavy work is equally potent where lighter construction is considered. Indeed, where the expense is to be kept to a minimum such service is even more necessary, as every dollar should be made to yield its utmost in the way of security and this can only be accomplished when a full and complete knowledge of the subject forms the working basis.

In view of the splendid showing of good design and strict economy that has been made under such conditions within the last few years, the architect who insists upon specialized advice and acquaints himself with the merit of real vault construction, and as far as practicable with its details, makes no mistake.

Farm Buildings on the Estate of C. K. G. Billings, Esq.

AT LOCUST VALLEY, LONG ISLAND, N. Y.

GUY LOWELL, ARCHITECT.



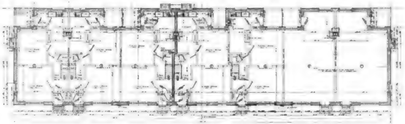
GENERAL VIEW AND FLOOR PLAN OF STABLE

VIEW OF CARRIAGE HOUSE AND GARAGE FROM STABLE YARD

GENERAL VIEW OF ENTRANCE FRONT

THE farm buildings on the estate of C. K. G. Billings, Esq., are grouped along a main driveway, conveniently accessible to one another and placed in respect to the natural conformation of the land and not in accordance with any formal consideration of architectural planning. The buildings are mostly of single stories and are lengthened out to fit in with the gently rolling country in which they are placed. The exterior walls are constructed of red brick laid with wide, white mortar joints. The trim is of white painted wood and the roofs of vari-colored slate.

The building illustrated above contains seven houses for servants and their families. It is simple in design and plan, but nevertheless displays much character because of the successful grouping of the windows and the clever manner in which lattice and flower boxes have been used to make points of interest in the composition. The building shown at the right is the power house.



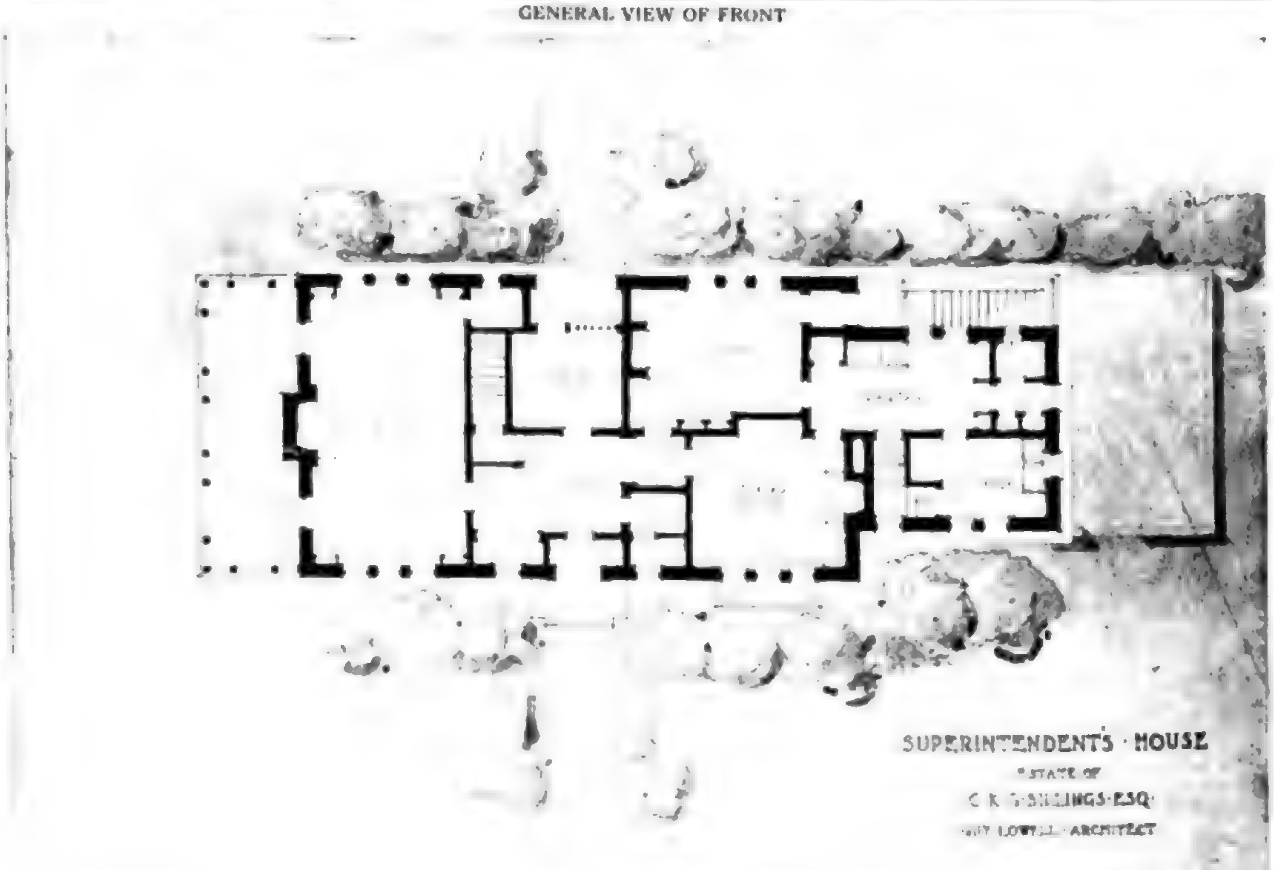
FIRST FLOOR PLAN

GROUP OF SERVANTS' COTTAGES

"FARNSWORTH," ESTATE OF C. K. G. BILLINGS, ESQ., LOCUST VALLEY, LONG ISLAND, N. Y.

GUY LOWELL, ARCHITECT

GENERAL VIEW OF FRONT



FIRST FLOOR PLAN

SUPERINTENDENT'S HOUSE

"FARNSWORTH," ESTATE OF C. K. G. BILLINGS, ESQ., LOCUST VALLEY, LONG ISLAND, N. Y.

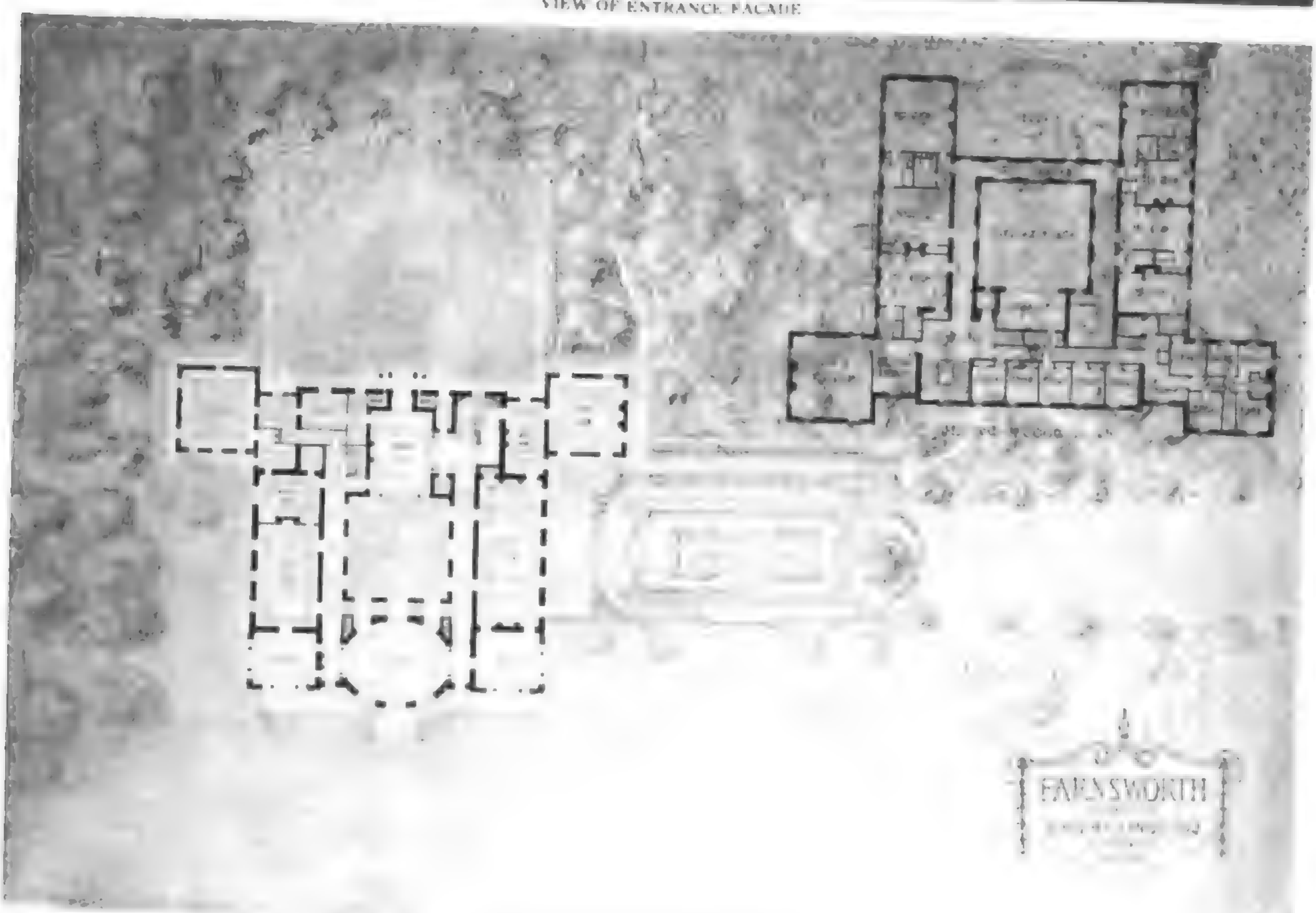
GUY LOWELL, ARCHITECT

VIEW OF TERRACE SIDE

GARDEN AND DRAWING ROOM TERRACE

"FARNSWORTH," ESTATE OF C. K. G. BILLINGS, ESQ., LOCUST VALLEY, LONG ISLAND, N. Y.
GUY LOWELL, ARCHITECT

VIEW OF ENTRANCE FACADE



PLOT AND MAIN FLOOR PLANS

"FARNSWORTH," ESTATE OF C. K. G. BILLINGS, ESQ., LOCUST VALLEY, LONG ISLAND, N. Y.

GUY LOWELL, ARCHITECT

INTERIOR VIEW OF LOGGIA

"FARNSWORTH," ESTATE OF C. K. G. BILLINGS, ESQ., LOCUST VALLEY, LONG ISLAND, N. Y.

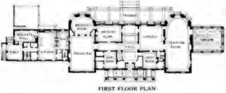
GUY LOWELL, ARCHITECT

GENERAL VIEW OF ENTRANCE FRONT

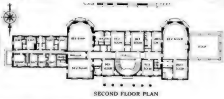
HOUSE OF CLIFFORD V. BROKAW, ESQ., GLEN COVE, LONG ISLAND, N. Y.

CHARLES A. PLATT, ARCHITECT

DETAIL OF ENTRANCE DOORWAY



FIRST FLOOR PLAN

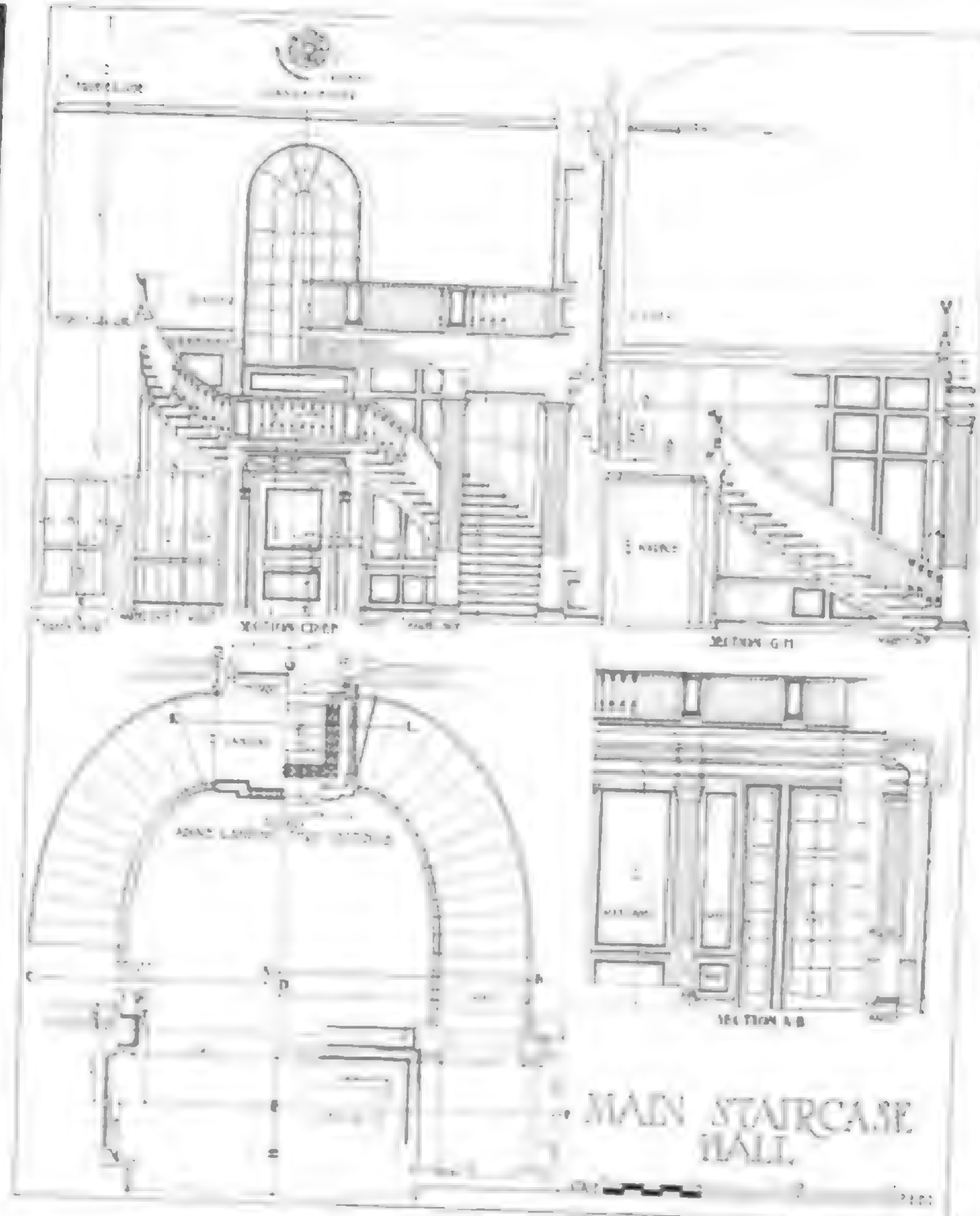


SECOND FLOOR PLAN

HOUSE OF CLIFFORD V. BROKAW, ESQ., GLEN COVE, LONG ISLAND, N. Y

CHARLES A. PLATT, ARCHITECT

VIEW OF MAIN STAIRWAY



DETAILS OF MAIN STAIRWAY AND HALL

HOUSE OF CLIFFORD V. BROKAW, ESQ., GLEN COVE, LONG ISLAND, N. Y.

CHARLES A. PLATT, ARCHITECT

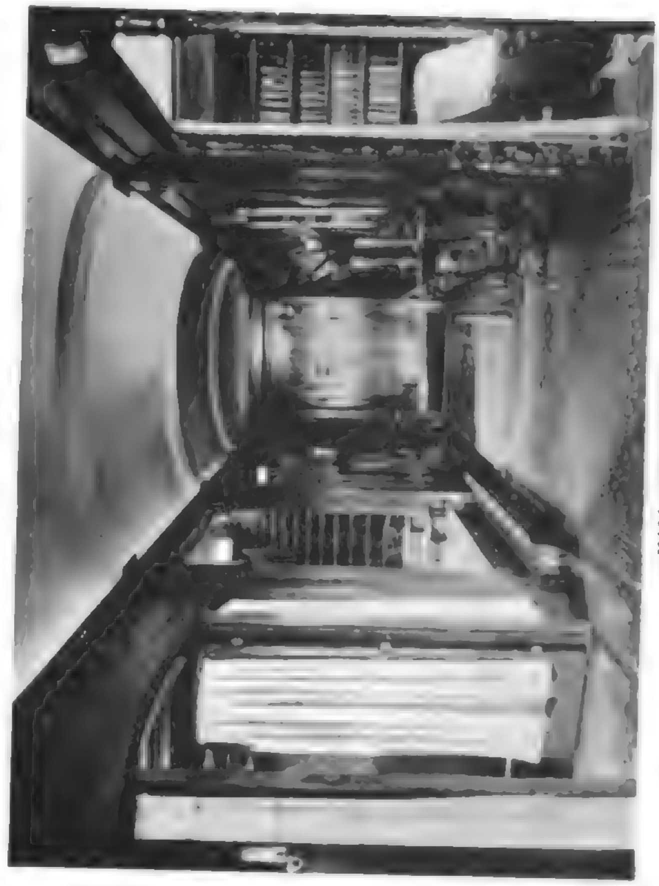
VIEW OF REAR FROM DRIVEWAY

VIEW OF FRONT FROM STREET

HOUSE OF JERE A. DOWNS, ESQ., WINCHESTER, MASS.

ROBERT COIT, ARCHITECT

LIBRARY



HALL AND STAIRWAY

VIEW FROM TERRACE

HOUSE OF JERE A. DOWNS, ESQ., WINCHESTER, MASS.
ROBERT COIT, ARCHITECT

GENERAL VIEW OF ENTRANCE FRONT

HOUSE OF THOMAS W. RUSSELL, ESQ., HARTFORD, CONN.

PARKER MORSE HOOPER, ARCHITECT. FRANK C. FARLEY, ASSOCIATED

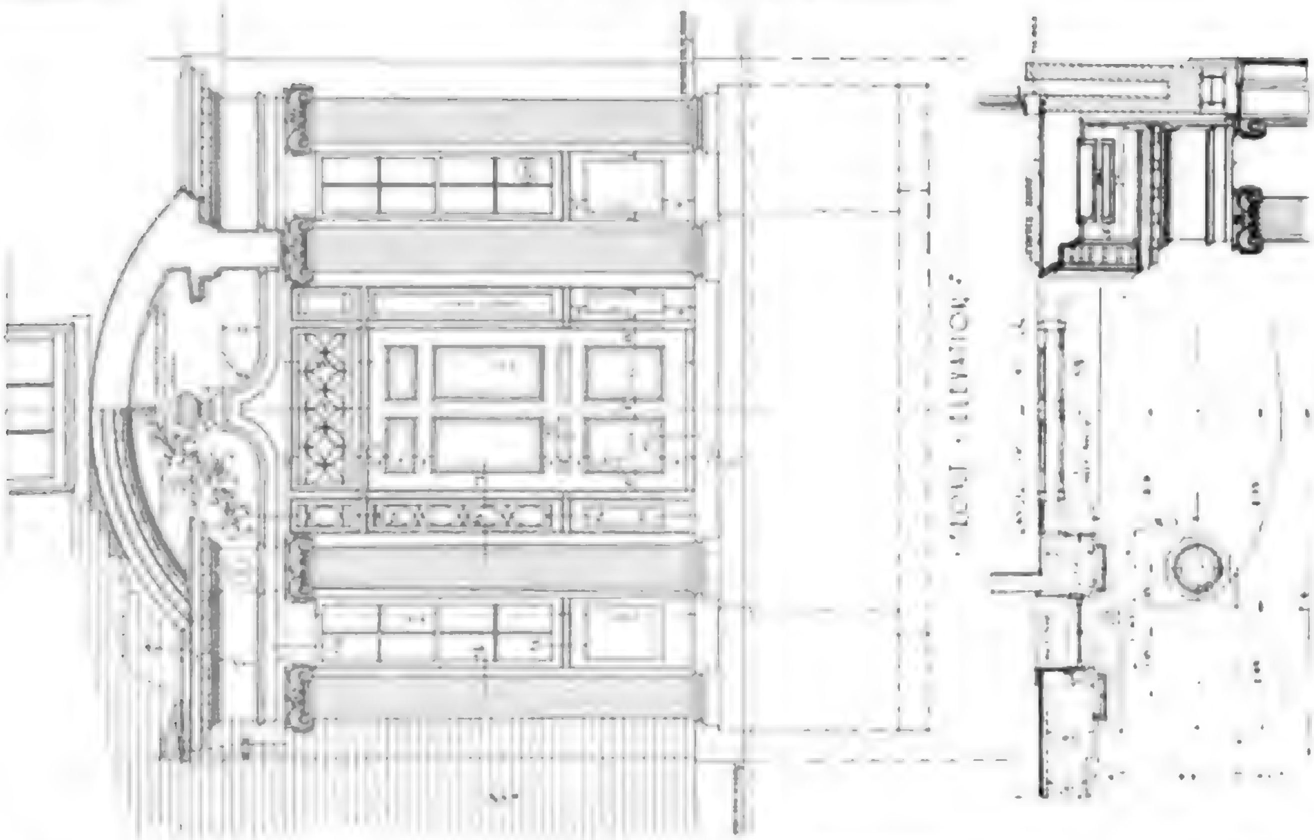
VIEW OF GARDEN SIDE

SECOND FLOOR PLAN

FIRST FLOOR PLAN

HOUSE OF THOMAS W. RUSSELL, ESQ., HARTFORD, CONN.

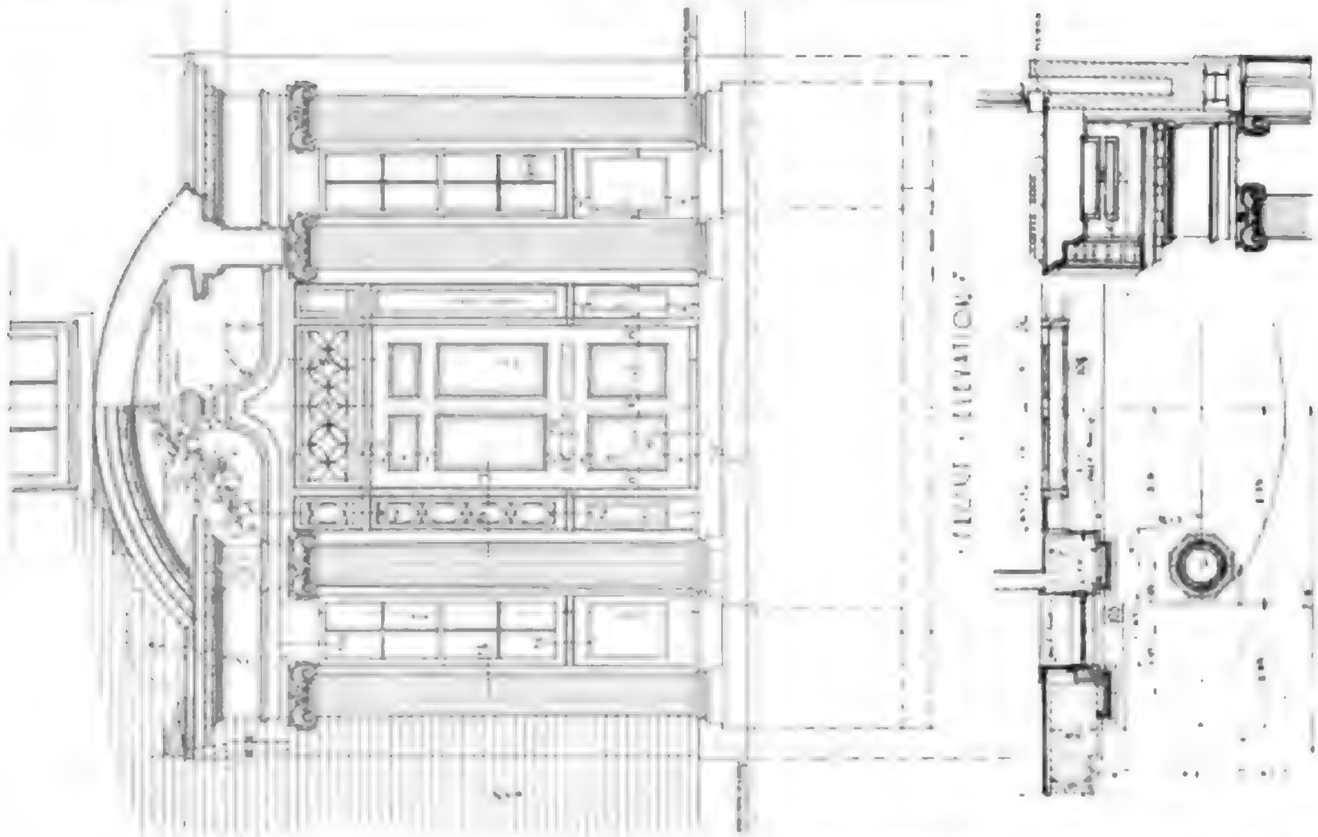
PARKER MORSE HOOPER, ARCHITECT. FRANK C. FARLEY ASSOCIATED



DETAILS OF ENTRANCE DOORWAY

HOUSE OF THOMAS W. RUSSELL, ESQ., HARTFORD, CONN.

PARKER MORSE HOOPER, ARCHITECT. FRANK C. FARLEY, ASSOCIATED



DETAILS OF ENTRANCE DOORWAY

HOUSE OF THOMAS W. RUSSELL, ESQ., HARTFORD, CONN.

PARKER MORSE HOOPER, ARCHITECT. FRANK C. FARLEY ASSOCIATED

DINING ROOM

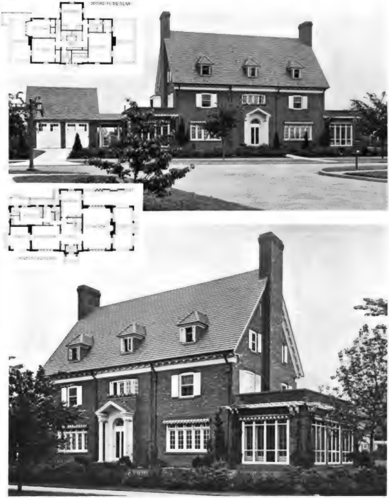
HALL AND STAIRWAY

HOUSE OF THOMAS W. RUSSELL, ESQ., HARTFORD, CONN.

PARKER MORSE HOOPER, ARCHITECT, FRANK C. FARLEY, ASSOCIATED

Two Houses Designed by Albro & Lindeberg, Architects.

AT FOREST HILLS GARDENS, LONG ISLAND, N. Y.

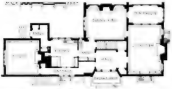


HOUSE OF HUGH MULLEN, ESQ., FOREST HILLS GARDENS, LONG ISLAND, N. Y.

VIEW FROM STREET

VIEW OF REAR

SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF BOARDMAN ROBINSON, ESQ., FOREST HILLS GARDENS, LONG ISLAND, N. Y.

ALBRO & LINDEBERG, ARCHITECTS

Architectural Features of the Garden.—II.

By JOHN T. FALLON.

THE most primitive types of gardening, we may readily believe, included the raising of timber frames for the support of climbing plants. The fondness of the ancients for the simple architecture of the colonnade is an additional reason to suppose them familiar with this method of displaying bloom. Again, the alleys of mediæval days were often enclosed with a framework for flowers, their builders knowing that the bloom could not be better shown than on the formal lines of post and crossbar.

One might say that the pergola is garden architecture *par excellence*; it is not architecture in the garden nor garden products placed upon architecture. It is the simplest form of construction completely possessed by plant and flower. Yet its qualities are architectural strength, rhythm, and stability, proceeding from orderly setting out, simplicity, and the repetition of its parts. The pergola can perform a most useful part in aiding the union between house and garden; it carries with it a structural significance and whenever it can be planned as an appendage of the building, it is valuable.

It should rarely stand alone, but should be connected with the lines of the design, flanked by a wall or gateway or garden house. It forms a light substitute for loggia or cloistered walk; it gives an air of shelter or privacy to positions that would otherwise be too open.

The variety of situations in which a pergola may well be placed is equaled only by the number of types and methods of its construction. Leaning against a high wall, enclosing a formal garden, built on a terraced hillside, in these and many more positions it will be found appropriate and useful. The nearer the house, the more solid and architectural should be the construction; this does not mean that the heavier types are confined to this position. The horizontal supports for the foliage should be of wood; columns or piers of stone, stucco, or brick, and even wood posts may be employed. Quite light material may serve for useful pergolas when the surroundings do not demand more solid construction.

It is curious that sundials should be so much more frequently employed in England than on the Continent. They are sometimes seen in Holland, but rarely in France, Spain, or Italy. They seem to take the place of the fountain of warmer climes in supplying the central motive of a garden scheme. Although, of course, they were originally regarded from the utilitarian standpoint, it was not long before it became the custom to devote considerable skill and attention to the design, for which reason they often survive in their position when all other traces of the garden have disappeared.

The sundial in essence is a very practical affair. In its use it has, however, been long superseded by the clock or watch. There is much to be urged in a continued use of the sundial. Its construction and material are well suited to its place out of doors, and it makes use of the natural movement of light and shade which are a part of the garden. Let us see that the sundial if used does its work, that it is set in sunlight, and that the dial is properly calculated for the position.

The pedestal dial is the best form and the baluster the best pattern, placed in the center of a lawn. A plain stone platform level with the turf is enough to rest it upon and it should not be made pretentious. The sundials on the wall or on the vertical face of a pillar were more common than the pedestal dial in former days. The pillar is a beautiful feature amid the flowers, raised to a good height. The wall dial has a very decorative value, and on the sides of the house or garden shelter it gives a lasting touch of interest. The dial with figures of box planted on the


Garden Pedestal, Vicenza


Garden Niche, Genoa


Garden Figure, Vicenza

Pergola in Garden at New London, Conn.
James Gamble Rogers, Architect

lawn is an interesting but difficult variation of treatment.

The picture of the garden is certainly not complete without the presence of pool or fountain. The elements of earth, water, and sky seem to form a complete unity, which is sadly broken when the first named is missing. Water in the garden is worth having whenever possible for the sake of the cool freshness that pervades the atmosphere wherever the mirror-like surface of the pool or the restless movement of the fountain is seen.

Fortunate is the man who possesses a garden with a running stream. There are a variety of ways to utilize this. In case there is an appreciable fall, a cascade can be schemed both at its entrance and departure from the garden. When the volume of water is small, a little stone edged canal may be formed along the center or the side of a lawn or flower garden, allowing it to enlarge in places to square or circular pools. The narrow, straight line of water between its stone margins is a charming feature in a formal garden, besides being a simple method for conducting water to and away from the central pool.

Assuming the stream to be of large dimensions, it is well to treat it architecturally for at least part of its length. In meadows or wood the natural winding bank is delightful, but in the garden the straight line is more appropriate and has greater possibilities. The various types of wall and balustrading may be employed, giving pleasant reflections in the water. Bridges require along with other architectural features some regular treatment, the rustic type failing absolutely to satisfy.

The more favorite form of pool is either the brimful type edged with simple stone margin level with the ground or the balustraded form. The former is equally suitable to the center of a lawn or formal paved court or an enclosed flower garden. A level stretch of stone paving or turf is the ideal setting for water, variety being introduced by the size and shape of the surface. A great number of designs can be made, all of simple, geometrical outline, — long, square, circular, elliptical, — with the addition of a few re-entering angles, scrolls, twists, or curves that serve to give interest and variation.

Garden fountains are best arranged when issuing from the center of a pool, although there are many positions where the isolated basin supported by an architectural or sculptured base is equally good. Endless ingenuity has been expended in the invention of fountains and cascades for the gardens of the Renaissance, and there is infinite pleasure to be obtained from combinations of sculpture and water. The simple jet, however, can be used with remarkable effect in many positions in the garden; it brings life and gaiety wherever it appears.

The garden seat is the original possessor of the name of garden furniture. While many adornments have come to be included in this title, the seat is the one piece of furniture that is indispensable in the garden. While it performs the same function as its indoor relative, it must be in tune with the scheme of the garden. Many garden seats are made too light for permanent out-of-door use and for proper harmony with the garden, and at the same

Garden of Mortimer Schiff, Esq., Oyster Bay, Long Island, N. Y.
James L. Greenleaf, Landscape Architect

time are too heavy to be carried into the shelter of the house. The fixed garden seat should be designed along permanent lines, and its position must be chosen with due regard for the design of the garden, and must have nothing haphazard in the way it is placed.

Position is the most important thing to choose first. The seat must be put in the right and desirable place for use, and this place must also be made appropriate to the design. The necessity for seats should not be overlooked when we outline the general idea of the garden; success in this detail will depend upon the appearance of purpose thus obtained. All open terraces are excellent situations for seats. They can be arranged in recesses in the walls at regular intervals or in projecting bastions. These projections are especially valuable when the terrace commands a view. The seat must not have its back to the view; they might be at right angles to the wall in pairs facing each other. Another position is at the end of a terrace or long walk.

Although an open situation is desirable for the seat, there are many places in the garden which invite some means for resting and enjoying the beauty of the garden at leisure. On lawns, in enclosed gardens, beneath the shade of a fine tree or in some secluded spot in the wild garden, the desire for a seat will be felt. No one regards an unsheltered seat as serviceable in all weathers, but as long as it is well built it will serve its purpose in the proper seasons. It is important that a good platform be provided, of paving, preferably. Seats require some attention in keeping them clean and in good condition, and unless they are of oak, should be painted every second year.

It is often possible to devise some shelter for a seat which will not necessarily be a garden house and yet have character. An arched recess in a wall, a niche of evergreens or treillage, will answer the purpose. The material to be used for seats is somewhat of a problem. The stone seat is naturally less adaptable for use, as the material is not so dry or clean as wood, but it undoubtedly harmonizes better with the garden. The chief point to be observed is in linking the stone seat to its surroundings. Where there is a curved wall of brick or stone or low piers with balustrading, the simple stone slab set some sixteen inches high will look natural and unaffected. Link it with the structural lines of the garden; if it must stand by itself, prolong the seat at each end to form a dwarf stone wall and finish with stone tubs for small trees.

Pergola in Garden at Grosse Point, Mich.
Trowbridge & Ackerman, Architects

Garden of Col. Elliott F. Shepard, Scarborough, N. Y.
McKim, Mead & White, Architects

Wooden seats are not less dependent upon their surroundings; but being more obviously pieces of furniture and being numerous on account of their usefulness, their design is susceptible of a wide freedom. Hard woods such as oak are the best materials, left in natural color or painted; but selected pine, if frequently painted, is also serviceable.

A fuller appreciation of architectural forms in the garden should bring a more general use of treillage than is to be seen at the present day. The French *treillageurs* who brought this art to perfection were but elaborating a custom that

has existed since the earliest days of garden making. It serves the important purpose of an effective method for setting out the garden and indicating its future development. The light and inexpensive character of trellis work lends itself most readily to this purpose. Its adaptability to almost any shape enables us to raise a pattern in a few days of the boundaries and features which will take years of growth and attention to mature.

From this use treillage has developed into greater importance and has come to fill a complete department of garden design. Practically every form of architectural structure can be imitated in trellis work, and curiously the imitation often adapts itself to the garden scheme more perfectly than the original. A garden enclosed by a trellis screen with arches, pilasters, and arbors of the same material may be made a very pleasant place but it will depend upon the forms employed. Trellis may easily become commonplace or tawdry, and unless it is to be entirely covered by foliage, its structural lines should give the appearance as well as have the reality of strength.

There are many places in the garden where treillage can effectively be employed, and it generally can safely be introduced wherever our predecessors would have been tempted to the so-called rustic type of architecture. Temples, arbors, summer houses, screens, enclosures for tennis courts or paved gardens, the backs of seats—all these are easily formed of this material. Trellis work gives a definite character to the garden in which it is used, and it is invaluable on new sites and in city gardens where well grown trees and hedges are absent. Yet its beauty is greatly enhanced by a background of trees which can be seen through its semi-transparent wall.

Garden vases and the like have an unfair prejudice attached to them as being merely the properties of the out-of-door scenic artist. Many examples of these ornaments are badly made and badly placed. But properly disposed, they are legitimate inhabitants of the garden. They represent one of the ways of introducing the human element.

The vase and urn, unless of unusual size, are commonly an accessory to some more important feature. They tend to be mean and superfluous if placed along the margin of a lawn or walk; but in conjunction with a balustrade, a flight of steps, or a low retaining wall they may be of great value. They are also of great charm when in close proximity to masses of foliage. Thus they are beautiful finials to gate posts, isolated pedestals, boundary walls, etc.

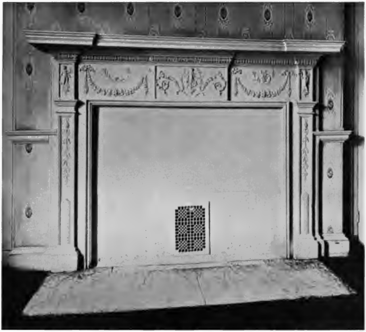
All boxes, tubs, and urns should be of ample size and set on the ground or on a structural base. The box or tub is a movable flower bed and has all the possibilities which its mobility provides. Placed at the angles of geometrical designs, emphasizing the salient points, it has the merit of raising the flowers and foliage to a higher level and thus introduces an important feature into the design.

May we make a plea for more thoughtful and intelligent garden architecture. Despite our love of flowers and gardens, the development of the architectural garden in America is just beginning.

Garden at Rosemont, Pa.
Duhring, Okie & Ziegler, Architects. Oglesby Paul, Landscape Architect

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS.

PLATE TWENTY-THREE.



THIS wood mantel displays in an effective way the fine feeling for proportion which the early designers possessed and which they invested in their work. Aside from its proportions the mantel is interesting because of the elaborate mouldings used. The keynote of the composition is the geometrically carved bed moulding which enlivens the cornice through the contrast of light and shade. All of the mouldings are made up of several members so designed that the face of the complete moulding shows a group of fine lines. The individual parts are small but in perfect scale with one another, and the main divisions agree in scale with the mass of the mantel.

The composition ornament on the frieze and pilasters shows very good modeling and this is especially true in the graceful festoons at either side of the center panel.

The fireplace opening is now covered over with plaster, hiding the original facing which was undoubtedly of light colored marble similar to that of the hearth. The other detail of the room is similar in scale and mouldings to the mantel, and the doors are divided into small panels with raised mouldings.

MANTEL IN FAIRFAX HOUSE, CAMERON STREET, ALEXANDRIA, VA.

Built in 1815.

MEASURED DRAWING ON FOLLOWING PAGE.

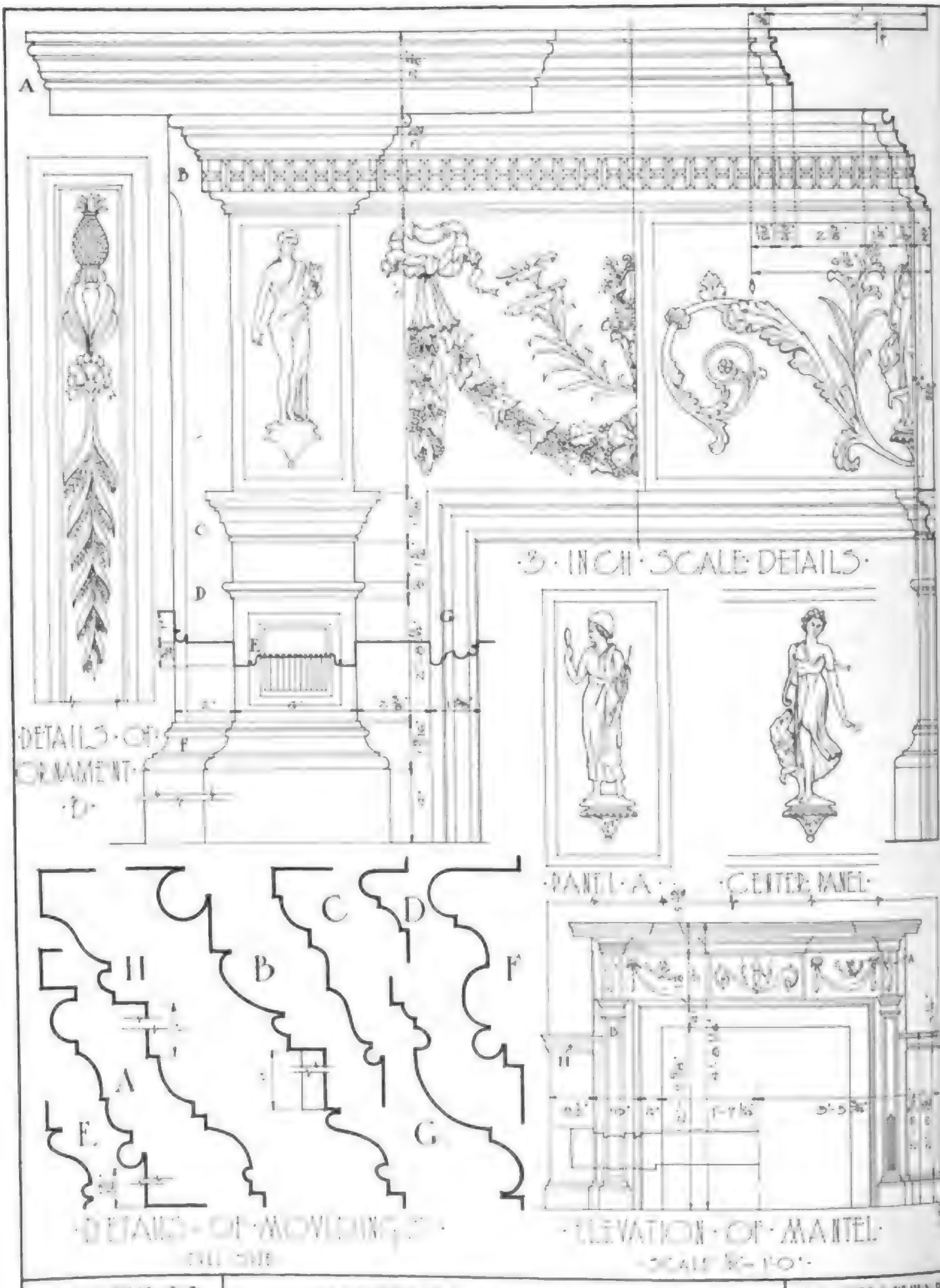


PLATE 23 JUNE 1916	·MANTEL·FAIRFAX·HOVSE· ·ALEXANDRIA·VA· ·DATE·1815· ·BVILT BY·WM·YEATON·	·MEASVRED & DRAWN·BY· ·J·L·KEISTER·O·J· ·MVNSON & J·A·WEBER·

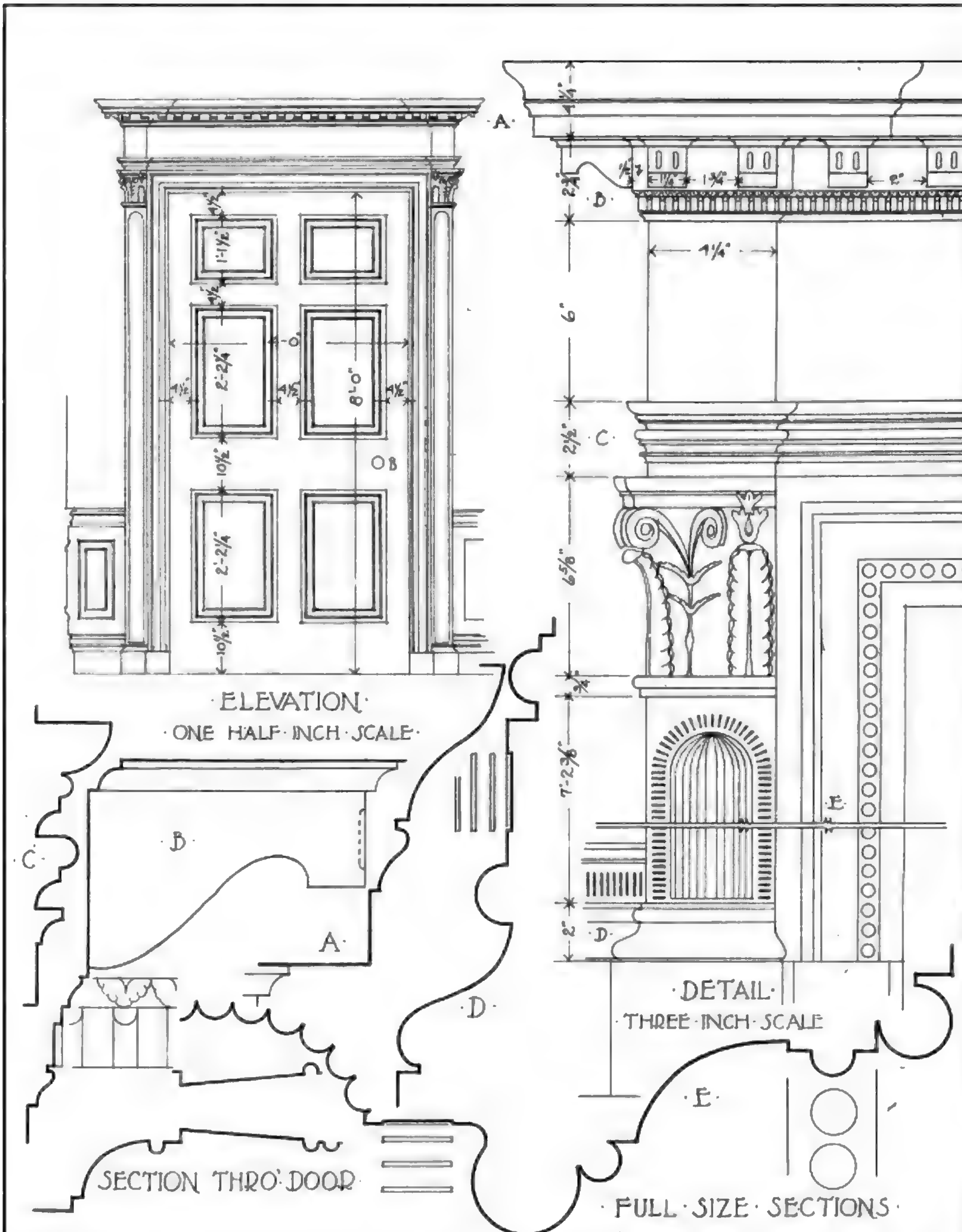


PLATE 24 JUNE 1916	·INTERIOR·DOORWAY·HOMEWOOD· ·BUILT 1804· ·BALTIMORE·MD·	·MEASURED &· ·DRAWN·BY· ·RIGGIN·BUCKLER

PLATE TWENTY-FOUR.

THIS doorway connects one of the drawing rooms with the hall and indicates the highly ornamental finish which is used throughout the house. The interiors show great variety in treatment for in no two rooms is the same detail used. A curious feature of the interior doors is that they are pivoted and will not swing back against the wall.

The house has but a single story with a high ceiling, consequently the scale of the interior is much larger than is customary in domestic work of this period.

INTERIOR DOORWAY, "HOMEWOOD," BALTIMORE, MD.

Built in 1804.

MEASURED DRAWING ON PRECEDING PAGE.

PLATE DESCRIPTION.

"Farnsworth," Estate of C. K. G. Billings, Esq., Locust Valley, Long Island, N. Y. Plates 81–84. One outstanding characteristic of Mr. C. K. G. Billings' house at Locust Valley is its extremely livable quality in spite of its large size. Its architectural style has chiefly been derived from Georgian precedents with a successful blending of the features of the large Italian villa in its plan. The interest of the house is centered about the large patio in the center, paved in colored and veined marble, and lighted from above, and about which are grouped the principal rooms. This room extends through two stories and is encircled on the second floor by a corridor from which the principal bedrooms are reached. Access is also had from this corridor to a large terrace above the loggia, commanding a splendid view.

The conformation of the land which slopes toward the north and also to the east was an important factor in determining the plan. The house, because of this fact, has been arranged in six different levels, all lighted from windows above the grade, although from most viewpoints it appears to be only three stories high. The entrance is at the grade of the forecourt, opening into the hall from which a view of the patio and loggia, on a lower level, is had through a large opening supported by columns. This arrangement gives an imposing ceiling height to the principal rooms and an effective way of displaying the beauty of the interior. In the basement there are placed the servants' hall, serving rooms, laundry, etc., and on the level below this the heating plant and cellars. The servants' bedrooms are on the second floor on the forecourt side, occupying space which is least desirable from the viewpoint of outlook. Only the main portion of the forecourt side is carried to the third story level. This portion of the building is occupied by guest rooms and gives access to the large area of roof which is flat and can be used for outdoor recreation.

Breakfast Room, House of Clifford V. Brokaw, Esq.
Glen Cove, Long Island, N. Y.
Charles A. Platt, Architect

House of Clifford V. Brokaw, Esq., Glen Cove, Long Island, N. Y. Plates 85–90. The simple and broad expression of Georgian architecture which Mr. Platt embodies in his country house designs is again evident in this house, situated under a mass of tall trees which provide a setting from whatever point the house is seen.

The exterior walls are built of dark red brick, laid in Flemish bond with ¼-inch gray mortar joints, and about 10 per cent of dark leaders. All trim is of limestone. The roof is covered with graduated slate of varying shades, ranging in thickness from ¾-inch butts at the eaves to 3/16-inch butts at the ridges.

The principal room of the interior is the large drawing room, which occupies the whole eastern end of the house. Large windows in the bay give access to the terrace on the south side. The architecture of the room is English Renaissance, executed entirely in white, with wide fluted pilasters and ornamented mouldings leading up to a richly decorated plaster ceiling.

Corresponding with the drawing room, at the western end of the house, are the dining and breakfast rooms. The dining room is a dignified apartment paneled in dark wood to the ceiling and ornamented with fluted pilasters and carved cornice similar in detail to that of the drawing room. The floor is of large squares of black and white marble.

House of Jere A. Downs, Esq., Winchester, Mass. Plates 91, 92. This house is situated on an eminence above the main highway, overlooking a small lake. The exterior walls show a combination of red brick, plaster, and half timber work in well proportioned areas, following the precedent of modern English domestic work. The roof is covered with slate of varying shades.

The plan is arranged to give each of the principal rooms an outlook toward the water, and the service quarters are grouped in a wing running off at an angle, forming in the rear a court from which the main entrance to the house is had. A wide grass terrace, into which stepping stones formed of tiles and cement have been placed, runs along the entire front facing the water and ties the house intimately to its surroundings.

House of Thomas W. Russell, Esq., Hartford, Conn. Plates 93–96. This house, situated on Bloomfield avenue, well removed from the street, has its main entrance facing full south. The sun parlor and porch, facing west and northwest, respectively, command a fine view of Talcott Mountain.

The walls are built of common red brick, selected for color, and laid in Flemish bond, with a fair sprinkling of dark leaders. The sills and key blocks of the first and second floor windows are marble, while the cornice and entrance porch are white painted wood. The roof is shingled. The interiors show Georgian precedent in their treatment in accord with the exterior. The hall and dining room are paneled with mouldings laid directly on the plaster walls.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

EACH successive year sees a larger interest shown in the effort being made to bring about an organized and systematic development of American cities. Considerable impetus has been given to the movement, which is generally recognized under the broad head of city or town planning, and the attention of the general public has been attracted to it through town planning conferences, held in important cities of the country during recent years, and because of the publicity which the American Institute of Architects has given the subject through its committee on town planning. This interest is far from being universal, however, and it probably has been engendered more from motives of curiosity than from a full knowledge of the benefits that would be derived from an adoption of the principles recommended or from an appreciation of the existing poor conditions.

There are conflicting ideas in the public mind concerning the meaning and purpose of town planning. There is but little comprehension of what the results sought for would be, the cost to obtain them, and the methods that would be employed to effect them. There is too general a fear that the adoption of plans organizing a city's development means a vast expenditure of money with which a municipality could not afford to burden itself. It is not appreciated by the great mass of American people that city planning, on the contrary, is really a preventive force, with the purpose of eliminating, as far as human agencies can, the mistakes in development which sooner or later will demand readjustment.

The average citizen becomes fully cognizant of the retarding force of narrow streets and poorly arranged main arteries of travel between centers to a city's growth only when it is evident that traffic congestion has become so great as to choke up every outlet, and to spell simply confusion and disorder if further expansion is attempted. Although he recognizes the evil when it exists, he has not the power of vision to see that all these conditions can be anticipated and that with expert knowledge and care the functions of various parts of a city may be forecast years in advance and the proper methods for their development determined.

This prevailing impression is the result of little or no knowledge of the subject and is a condition which militates against the appreciation of the vast good that will come from the co-operation of all citizens in the movement. A campaign of education must be carried on which will correctly convey to the public mind the great benefits of city planning and the means by which results are obtained. Such work is being done now, it is true, as the case of the Chicago City Plan Commission will testify, by their introduction into the public schools of that city of a text-book to acquaint the coming generation with the Chicago Plan, but the possibilities of constructive work in stimulating more active interest are still far from development.

At the recent National Conference on Community Centers means were discussed for enlisting the attention and co-operation of the public. It was pointed out that the encouragement of small neighborhood centers, apart from the larger city unit, would engender a local civic pride which would gradually lead, through the effect of making each district a complete civic unit, to a general expression in co-operation which would have for its ultimate aim the grouping of these several communities into one corporate whole. These centers are growing up about every large city to-day; but little effort is made by the private interests that control their development to insure open spaces and blocks that can be used for the building up of a social center or for the municipal and public structures certain to be needed in the future. Rarely are the streets arranged on any other than the gridiron plan, and from the start every obstacle is placed in the way of realizing a community in which the various units will be logically disposed and the whole joined by suitable arteries of communication into one organism. These same communities will, in the course of time, be called upon to be an integral part of the large city unit. Unless a broad, constructive policy has dictated their development from the first, when the need for expansion comes, the truth will be learned that the city has been encircled with a group of wretchedly planned suburban communities which stultify further growth because of their absolute unfitness to form a part of any large scheme, and the inevitable readjustment, with tremendous expense entailed, will be the accompaniment.

Education tending to develop the community spirit will be a strong influence in bettering conditions; but in no more forceful or better way can the advantages of organized development be proved than by the architect in advocating the proper placing and interrelation of public buildings, the orderly development of private property, the provision for future expansion, and the necessity for parks and open spaces that will afford light, air, and opportunities for recreation to the people residing in the neighborhood.

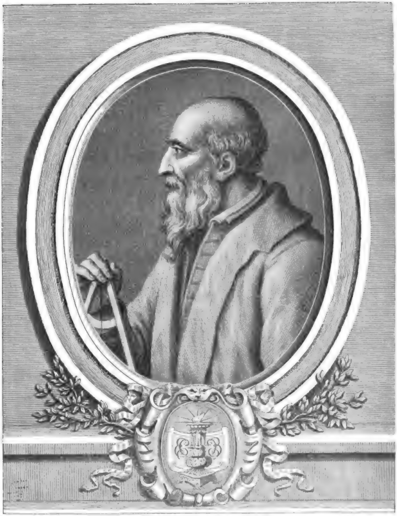
The architect is naturally endowed with creative imagination which enables him to have a broader vision in big constructive problems than almost any one else, and the city planning movement is well deserving of the best use of his faculties and his vigorous co-operation. City planning is indeed closely associated with architecture; it demands the same combination of qualities that are needed to make a successful architect and provides a fertile field for the application of the greatest talent. Architects are fitted to be leaders in city planning and it devolves upon them, both from civic obligation and duty to their profession, to participate in the movement and give to it the support which their talents, training, and experience make possible.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

JULY, 1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS



MICHELE SAN MICHELE

BORN IN VERONA, 1484. DIED 1558. ARCHITECT OF THE CHURCH OF THE MADONNA DI CAMPAGNA AND PONTE NUOVA, VERONA; PALACES OF THE COUNTS OF CANOSSA, VERONA, AND OF GIROLAMO GRIMANI, VENICE

THE BRICKBVILDER

VOLUME XXV JULY, 1916 NUMBER 7

The Planning of Trade and Industrial School Buildings.

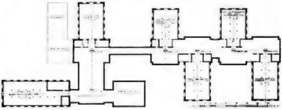
By LEWIS GUSTAFSON.

Superintendent of The David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.

II. DESCRIPTION OF IMPORTANT SCHOOLS (Concluding Paper).

THE preceding paper indicated the characteristic features of the modern trade school and suggested ways of designing such buildings that would make them most nearly meet the requirements of this branch of education. In the present paper a group of schools that have been built in recent years are given detailed consideration, in the attempt to show the gradual formation of definite principles relating to the housing of these institutions and how they have been put into practice.

THE SCHOOL OF APPLIED INDUSTRIES in Pittsburgh forms part of the Carnegie Institute of Technology founded by Mr. Andrew Carnegie, and the building here presented in diagram is the first of the twelve buildings on the Institute Campus. Blessed with ample grounds and extensive funds, this school was able to spread out. Its large shops, some 30 feet high, lighted on three sides and staggered to secure the maximum of light and air, are the most spacious school shops in the country. Connecting with them and not indicated in the diagram are storerooms and class rooms, while in the central administrative unit are the offices, the bookstore, class rooms, lecture hall, etc. The close resemblance which several of the other plans presented herewith bear to this school in their general scheme is not accidental. The Carnegie School was the first of the lot in point of time, being completed in 1905, and has served as a useful exemplar for those which followed, thanks to the courtesy of Director Arthur A. Hamerschlag, Dean Clifford B. Connelley, and Mr. Arthur L. Williston, now principal of Wentworth Institute, Boston. These gentlemen formed the expert advisory committee of three to formulate the general



Floor Plan, School of Applied Industries, Pittsburgh, Pa.

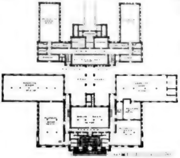
School of Applied Industries, Carnegie Institute of Technology, Pittsburgh, Pa.

Palmer & Hornbostel, Architects

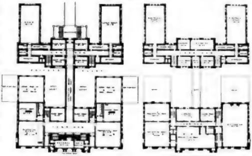
scheme for the Institute and have always been generous in their gifts of time and advice to schoolmen and architects seeking suggestions for similar schools.

The David Ranken, Jr., School of Mechanical Trades, in St. Louis, on the contrary, was restricted by Mr. Ranken, its founder, to a limited sum of money for its first building, it being Mr. Ranken's idea to begin experimentally in a small way and let the school expand gradually. The first building, facing Cook avenue, was designed in 1907, after a visit to Pittsburgh and following consultations with Messrs. Hamerschlag, Connelley, and Williston. The general resemblance of the shop wings to those at the Carnegie School is easily seen.

Block Plan



Ground Floor Plan

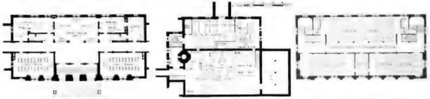


First Floor Plan

Second Floor Plan

The David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.

This building, conveniently arranged and thoroughly well lighted and ventilated, proved quite satisfactory for the first two or three years, but as the trade courses grew and the size of the work and the number of students increased, several of the shops (purposely made not overlarge) proved inadequate in size for the trades which they housed. To combine two shops for one purpose was of course not possible because no shop adjoined another, and to open up the shops back to the alley by absorbing locker room, toilet room, corridor, and storeroom was not feasible because all interior partitions were bearing walls of brick. It was found necessary, therefore, in 1912 to construct another building with larger shops for the bulkier trades, and to reserve the first building for trades whose work was not so large. For such purpose and as an experimental building for new trades this first structure will continue to serve admirably. The great value of the shops in this building lies in their being bare open spaces 35 by 70 feet in dimensions, with ceilings 14 feet high, to which are led water, gas, and electricity. The varied uses to which such rooms may be put will be made clear by a recital of the history of the west wing on the main floor. This shop served as an assembly room during 1909–10, the first year of the school, as a pattern shop from 1910 to 1913, as the first year machine shop from 1913 to 1915, as drafting room and shop for sheet metal pattern drafting during the winter 1915–16, and has now temporarily gone back to its original use as a place of assembly. For all these purposes, except as a machine shop, it has done well. It was abandoned as a pattern shop because it was found more convenient in handling lumber and in using the shavings exhaust to place the patternmaking in the new building adjoining the carpentry. As a machine shop it was only half large enough after its first year, and since it was found impracticable to have half the machine instruction on this floor and the other half on the floor below, both shops were combined in a larger room in the new building.



First Floor Plan of Central Unit

Floor Plan of Power Plant

Second Floor Plan of Central Unit

Wentworth Institute, Boston, Mass.

Peabody & Stearns, Architects

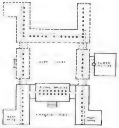


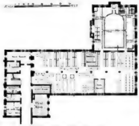
Fig. A. Block Plan of Wentworth Institute

This second building, opened in 1913, was designed to avoid the rigidity of the first. Except on the stairways and on the ground floor, where the shops, 47 feet wide and 76, 96, and 110 feet long, seem ample for future needs, all interior walls are of three and four inch hollow tile, allowing for almost unlimited alteration. Already two partitions on the top floor have been removed, one to enlarge a drafting room and the other to enlarge the library. No rooms, except offices and washrooms, contain attachments or fixtures or partitions that will prevent their being used for any other purpose. The gymnasium and the library are only bare rooms used temporarily for the purposes designated; as the institution grows they will be given over to other uses.

The buildings of WENTWORTH INSTITUTE in Boston, endowed by Arioch Wentworth and opened in 1911, are worthy of careful study not only because they represent the results of Principal Williston's experience as Director of the School of Science and Technology at Pratt Institute and his investigations as one of the committee to establish the Carnegie Institute, but because they have had their influence on the second building of the Ranken School just described, and on the Milwaukee School and Pullman School to follow. As explained by Mr. Williston to the architects, six things were desirable: 1, All departments should resemble in appearance and general arrangement of equipment as closely as possible corresponding departments in commercial manufacturing plants; 2, the Institute should set a high standard in efficient use of floor space and in its plan for simple and direct travel of material and workers from sub-department to sub-department; 3, in order to control the entire student body a single entrance should be provided, close to the general office and in a central building, where pupils from all departments must enter and leave the school; 4, the principle of student control in 3 should be carried out in the design and arrangement of all sub-departments; 5, as some departments may grow faster than others it should be possible to provide more space for these without disarrangement of other departments or deranging the general plan in architectural effect; and 6, con-

Fig. B. Typical Floor Plan of Standard Unit

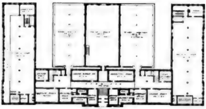
Typical Floor Plan of East Wing



First Floor Plan of West Wing

Basement Floor Plan of West Wing

Wentworth Institute, Boston, Mass.
Peabody & Stearns, Architects

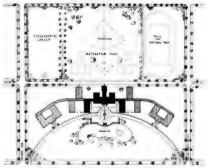


First Floor Plan

Central Part of Third Floor Plan

The Milwaukee Public School of Trades for Boys

W. W. Maxwell, Architect



Plot Plan of Pullman Free School of Manual Training

venient means of delivery of heavy material to shops and laboratories should be provided independent of main entrances and hallways. To meet these requirements there was adopted as a *standard unit* of construction a three and one-half story building, 48 feet wide by 144 feet long, divided into nine bays of 16 feet each. This floor space is divisible as shown in Figs. A and B. The whole width may be used for shops or laboratories, or a corridor 8 feet wide may be run on one side of the center row of columns, giving rooms 24 feet wide on one side for class rooms or lecture rooms, and 16 feet wide on the other for offices, instrument rooms, or washrooms. This allowance of nine 16-foot bays permits the entrance to any standard unit building to come at either end or in the center, or permits adding wings in domino fashion for an L shaped or U shaped or T shaped building. The central building has a width of 64 feet.

THE MILWAUKEE PUBLIC SCHOOL OF TRADES FOR BOYS, supported by a special tax, shows in its extreme wings another application of this 48-foot width with nine equal 16-foot bays, and in its central portion the use of wide and narrow rooms each side of a central corridor. The general plan is restricted to the dimensions of a city block, that being all the ground available. The building is three stories high with a basement. The plans here given show the entire main floor and the central portion of the third floor. In the basement is the boiler room below the space indicated as engine room on the plan; a second plumbing shop is in the left wing for soil pipe work and a storeroom is under the machine shop. The second floor contains in the left wing a carpentry shop, similar to the shop for plumbing but with erecting space at the rear end 47 by 33 feet, and two stories high. In the right wing over the machine shop is the pattern shop. In the center part of this floor are the library and the exhibit room similar to the drawing rooms indicated on the third floor plans. The top floor in the left wing has a vacant room for a new trade and in the right wing an electrical shop. The wings indicated as flanking the engine room go up three stories, and above the first floor have light on two sides and at the end. No provision is made on these plans for a gymnasium, an assembly hall, or a science department, but any of the large spaces indicated could be

Typical Ground Floor Shop (Wood Working)

Typical Upper Floor Shop Metal Working

Pullman Free School of Manual Training, Pullman, Ill.

C. Frank Jobson, Architect

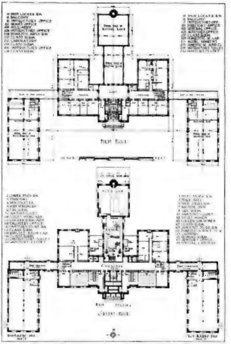
made available for any of the three (barring columns in the gymnasium) should the school find itself desirous of having them.

The Pullman Free School of Manual Training, endowed by George M. Pullman and opened in 1915, is the only institution shown which is co-educational. This school is fortunate in having an unusually large campus, giving room to grow and allowing for an attractive block plan. Although it is called a school of manual training, it is more on the order of an intensive technical high school designed to train for the industries.

As seen on the plans the shops are 48 feet in width and 80 feet long, the shop wings being in five bays of 16 feet. All shops are in effect two stories high. In connection with the shops is a convenient arrangement of instructor's office and class room on a mezzanine floor overlooking the working space. The boiler and engine room are intended for instructional use and are conveniently located in the central wing. The domestic science rooms contain a model flat for instructional purposes. In block plan the school resembles both Wentworth and Carnegie Institutes.

The Worcester Boys' Trade School, supported by a public tax, has a more generous provision of ground than the Milwaukee School. The general scheme provides for a combined administration and class room building along the front, this being five stories high in the central portion, with several shop wings extending to the rear. The part marked A was built in 1909; those marked B and C have been recently completed.

The arrangement of the first and second floors may be seen from the plans reproduced herewith. On the third floor the shop wing drops off, leaving the front part 60 feet deep with an auditorium in the center, class rooms at the left end, and a printing department at the right. This auditorium, about 58 by 88 feet, is provided with a stage and a moving picture booth. In the basement, on a line below the auditorium, is a gymnasium about 57 by 87 feet, and 20 feet high. The basement under the machine shop is divided lengthwise, with the power plant in the courtyard half and an electri-



Pullman Free School of Manual Training, Pullman, Ill.

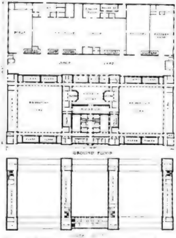
General Exterior View from Front
Pullman Free School of Manual Training, Pullman, Ill.
C. Frank Jobson, Architect

cal shop in the other half. These shops are extremely narrow, since the wing itself is only 42 feet wide. This width is satisfactory for a single shop but not so satisfactory for subdivision either lengthwise as here or crosswise as on the floor above, where it is necessary to pass through one shop to reach another. The 48 or 60 foot width used elsewhere is preferable.

The plans of L'Ecole Nationale D'Arts et Metiers de Paris are given as an interesting working out of the problem on a monumental scale. This school does not teach trades but gives a general mechanical preparation. The separate shop building is lighted from the sky and is a purely factory type of building. It contains no permanent interior walls; in fact, the partitions are only screens reaching part way to the ceiling. The court could be covered over, connecting this building with the main school, in which case it would present the idea as illustrated in the typical plan X, shown in the first paper of this article.

The Technical High School. This review of the subject would not be complete without reference, in passing, to the Carter H. Harrison Technical High School in Chicago. (See The Brickbvilder, March, 1916, for plans and photographs.) This school is an example of a new tendency in our public schools which marks the middle ground between the general high school with a manual training department and the out and out technical or trade school.

In Chicago a strong effort, rich in successful results, has been made not only to connect with the industries the manual training course for the regular high school pupils by making it more industrial in content and method, but also to render a distinct service to those already employed in the industries by offering them technical training. Schools like the Harrison will be largely multiplied in the next few years, for the reason that as public school boards feel the increasing demand for industrial education they will very properly look to the technical high school as one of the simplest logical means of meeting that demand for those who do not desire or need the closer specialization of the trade school.



Plan of L'École Nationale D'Arts et Métiers, Paris, France

Exterior, Worcester Boys' Trade School, Worcester, Mass.

Plot Plan

First Floor Plan

Second Floor Plan

Worcester Boys' Trade School, Worcester, Mass.
L. W. Briggs Co., Architects

School Sanitation.

By HAROLD L. ALT.

THE sanitary work for a school building is, in general, divided into two distinct classes, viz., common toilet facilities and special school requirements.

Under the head of common toilet facilities we have the general toilet room arrangements, hot and cold water supply, gas, private toilets, and miscellaneous lavatories and sinks—equipment commonly installed in almost every structure—while under special requirements we have umbrella drains, chemistry, physics, and other laboratory service, kitchen and lunch room service, cooking class work, etc.

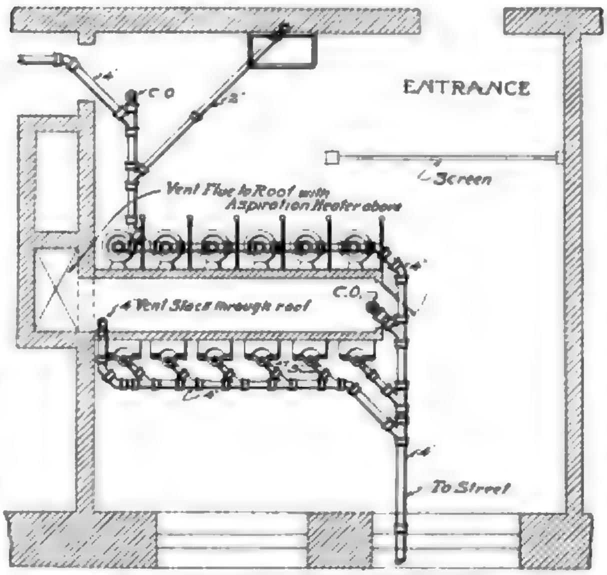


Fig. 1. Typical Plan of Boys' Basement Toilet

The general facilities must be modified to suit the exacting requirements of schools where common sense, ordinary care, and reasonable use of the fixtures *cannot* be expected. With the possible exception of railroad toilet rooms and public comfort stations, no plumbing fixtures suffer the abuse to which school fixtures are subjected; in the first two cases mentioned the presence of an attendant often is a great deterrent to excessive abuse, but the public school never uses any such safeguard.

School fixtures are made largely automatic, many performing their flushing and closing off functions complete without any special manipulation; others are arranged only to shut off automatically after being manually set in operation. Automatic fixtures are especially desirable for very small pupils and for schools serving a large foreign element.

The location and arrangement of the toilet rooms of a school is a subject of great importance. In general, the boys' and girls' toilet rooms should be located at opposite ends of the building or, if placed in the basement, adjacent, with a partition having a locked door dividing the corridor between the two rooms, and access should be obtained to each room from the floors above only by means of the stairway located on the side of the building where the rooms are respectively situated. In spite of the fact that the basement toilet occupies what would otherwise be waste space to a great extent, its location is not good and can hardly be considered in a school over two stories high. The general tendency to-day is toward boys' and girls' toilets, one at each end of the building, and on each and every floor.

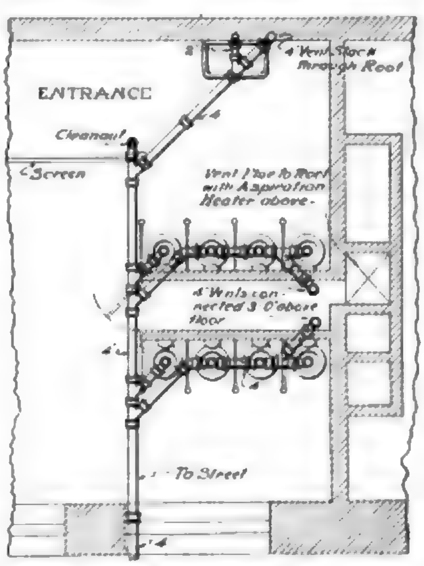


Fig. 2. Typical Plan of Girls' Basement Toilet

Placing these toilets directly over one another greatly diminishes the expense of piping and makes the room location easier to find than where the toilets are arranged strictly in regard to the requirements of room space on the particular floor where they may be located.

In piping toilets, considerable money can be saved by the use of "circuit" or "loop" venting in preference to the "continuous" or "back venting" system. This means each closet outlet, urinal trap, and lavatory trap is kept within three to five feet of the main soil or waste line and the end of the main line is carried through to the roof as a main vent or relief pipe. Where this system is followed out in *entirety*, the lavatories have "non-syphoning" traps, but in many cases the lavatories are back vented and the circuit system used on the water closets and urinals *only*.

The number of fixtures required for a school of given capacity is a subject always open for dispute, and the following minimum, average, and maximum number of fixtures per hundred pupils' capacity will give a good idea of what is being done in the new schools:

	Water Closets	Urinals	Lavatories	Fountains
Grammar Schools				
Minimum	6.03	1.57	1.82	1.09
Maximum	7.29	2.18	6.43	1.29
High Schools				
Minimum	2.95	1.47	2.92	.52
Maximum	5.33	2.19	10.22	4.66
Average	4.92	1.79	4.90	1.68

In the above, where trough urinals are used, two feet of length was considered as equal to a stall urinal when separate fixtures were used. It will be noted that some fixtures are slightly increased in number for the grammar schools which include kindergartens and very young pupils.

A typical basement toilet for boys is shown in Fig. 1 and for girls in Fig. 2, these being recently installed

in a new grammar school. The fixtures are local, vented into the pipe space between the two rows, and this pipe space is connected to a vent flue with a steam heater therein to create a draft. This method is fairly satisfactory, but cannot be compared to the use of a fan for *positively* exhausting the air. Note how the doorways and entrances are screened to prevent a view of the room being seen by the passersby in the corridor outside.

For a larger school still, using basement toilets, a layout such as is shown in Fig. 3 is good. The boys' room is similar, but has urinals substituted for water closets on one side of the vent space. The vent corridor is connected horizontally, either by an underground duct or one run across the ceiling, to a convenient location where a vertical flue can be run up to the roof.

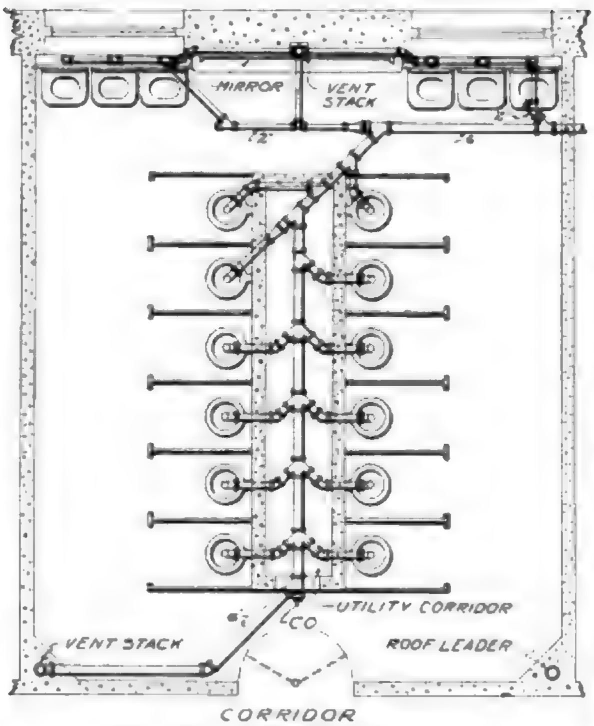


Fig. 3. Plan of Large Basement Toilet for Girls

There is little doubt that local vented fixtures are being generally adopted for school work. These fixtures consist of the automatic compression closet, or in high schools often a flush valve closet, with a raised vent connected to a vent space back of the fixture, as shown in Fig. 4. This vent space is connected to a flue operated by aspiration surface or a fan. For urinals, either an integral local vent is used, as also indicated in Fig. 4, at the upper LV, or by a branch from the waste pipe, as indicated at the lower LV; either, but not both, schemes may be used.

Sometimes to reduce the cost of purchasing local vented closets which are considerably more expensive than the ordinary syphon jet type, a register is placed in the partition directly back of the fixture, similar to the scheme shown in Fig. 5, these registers being about 6 by 6 inches, or 8 by 10 inches in size, and opening into a vent space the same as used for the local vent closets.

While the writer does not approve the use of trough urinals, where installed, for the sake of economy, the need for local ventilation is even greater than with the stall type shown in Fig. 4. This is easily accomplished by setting the inclined slab out from the back of the trough, as shown in Fig. 6, the air circulating across the trough and under the slab into the vent space in the rear, from which compartment it is exhausted to the outer air.

All that has been said regarding fixtures in basement toilets applies equally well when the toilet rooms are placed on the upper floors, with the notable exception that when so located it is seldom possible to get a "utility corridor" back of the fixtures. Space is much more valuable on the upper floors than in the basement, and two feet additional for a pipe corridor back of the fixtures for each of two toilets means a loss of *four* feet somewhere in the class rooms located between the two. Moreover, the toilet room must have not only outside air, but also an entrance from the corridor. This produces a *long, narrow* room, and a pipe space of correspondingly greater length, thus further increasing the loss of space.

Generally the toilets on the upper floors develop into an arrangement something like the one given in Fig. 7, the length of this room being equal to the width of the class rooms and the width of the room equal to the depth of the water closet stalls plus a passageway in front of the stalls, which usually means a total of seven to eight feet.

It will be noted that there is a small private compartment shown in Fig. 7, containing a closet and lavatory, this being for use in case of sudden sickness. In the boys' room this space and that occupied by two water closet stalls are utilized for urinals.

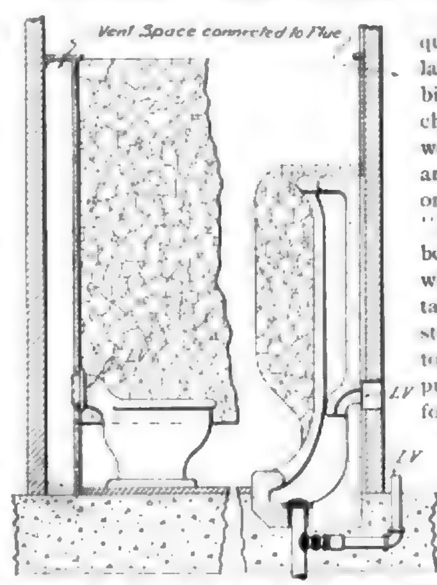


Fig. 4. Details of Venting Arrangements

The most exacting of the special requirements are those for chemistry laboratories where considerable flexibility should be contemplated. No chemistry instructor ever seems to want to teach in a room laid out by another instructor. In fact one claimed only recently that it was absolutely "impossible" to teach in the room being built from an arrangement made with great care and only after consultation with the previous chemistry instructor. So everything done was torn out and everything undone was put in — at the usual higher price paid for extras.

Most important in laboratory work is the providing of sufficient floor fill to accommodate the diversified piping and electric conduits. A case where such fill was not provided, resulting in much trouble is shown in Fig. 8 where

the pupils' table T and the instructor's table IT are ventilated by a duct VD connected to a space under the step S. The floor fill in this case was so small that gas G and water lines CW could not cross the lead lined waste branches W, and no pipes could cross the vent duct VD. Considerable ingenuity was necessary and numerous undesirable offsets were made in order to give the service at the points desired. At the right hand side of the sketch is an elevation showing the lead lined waste stack LL, the cast iron vent extension CI and the connection into the sewer line in the basement B. The wastes from the various sinks in the tables were all collected into a common lead waste running to a lead drum trap placed at the end of the table nearest the instructor's table. This lead drum trap discharged into the lead lined branch waste pipe LL, the continuation being shown on the elevation. Oftentimes these acid wastes are carried to a diluting tank in the basement where lime is used to neutralize the acid action.

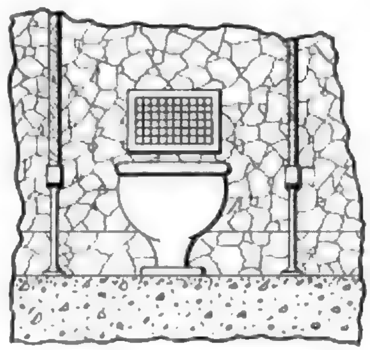


Fig. 5. Register Type of Vent

If possible all rooms having special piping should have a floor fill at least 6 inches deeper than the ordinary 3 to 3½ inches so as to properly conceal pipes and to allow the necessary grading of same. This is preferably obtained by dropping the rough floor construction rather than by raising the finished floor and thus producing an unexpected step.

In the wardrobes copper safes 6 to 8 inches wide and as long as the line of hooks above are sometimes provided to take the drip from the multitude of umbrellas brought in on a wet or snowy day. Unless this drip pan is provided with a waste pipe it becomes a receptacle for stagnant, dirty water into which coats or hats may be dropped. Besides this the falling of a steel pointed umbrella on to the copper is liable to puncture the thin gauge and make leaks on to the floor through the bottom of the trough.

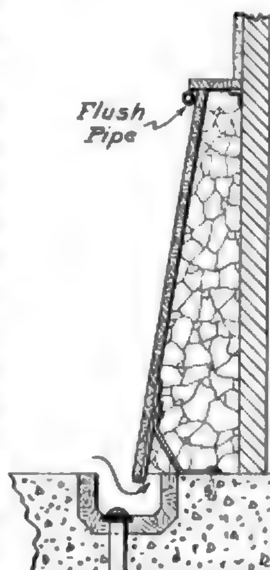


Fig. 6. Method of Venting Trough Urinal

A much better arrangement than this is a concrete gutter run completely around the wardrobe and connected to a waste pipe somewhat as shown in Fig. 9. This gutter is formed as part of the floor and will last as long as the building. It is essential that waste stacks so used be emptied into slop sinks and not connected directly to the sewer in order to avoid the dangers of sewer gas.

It is often very difficult to make proper plumbing connections to sinks located in demonstration tables set out into the room. Where the local plumbing code allows circuit venting the carrying of the horizontal waste under the floor, past the sink, and over to the nearest wall up which it extended through the roof for a relief, together with the use of a non-syphoning trap solve the problem but where continuous venting is required the solution is not so easy. In some cases permission can be obtained from the local authorities to drop the vent below the floor after rising above the fixture; in other cases circuit venting will be allowed as a substitute for continuous venting. Few authorities are encountered who are so absolutely ruthless in regard to appearances as to insist on carrying a 1½-inch vent pipe up in the middle of the room from the instructor's table to the ceiling.

In arranging cooking class sinks the same difficulty arises especially if the sinks are located in a counter running around the center of the room. The faucets, vent pipes and water lines not only complicate the counter construction but also obscure the pupils' vision of the instructor. In the best designed schools sinks are being plentifully located around the side walls at points where it is possible to install them, and the counters are kept unencumbered except for gas stoves at frequent intervals. This wall arrangement, of course, results in plumbing exactly similar to any ordinary kitchen sink.

It is a peculiarity of school sanitation that while drinking fountains are usually provided in abundance there is very seldom any provision made to supply the water in a cooled or desirable drinking condition. The favorite practice is to run a ½-inch or ⅜ inch branch from the nearest cold water line and connect this to the fountain with neither filtration nor cooling provided. While this makes the plumbing easy and simple to install the results are not at all what might be desired.

The simplest form of water cooling consists of the common water cooler tank in which ice is melted in the tank to produce the desired lower temperature. This is not suitable for school use because the purity of the water becomes dependent on the purity of the ice.

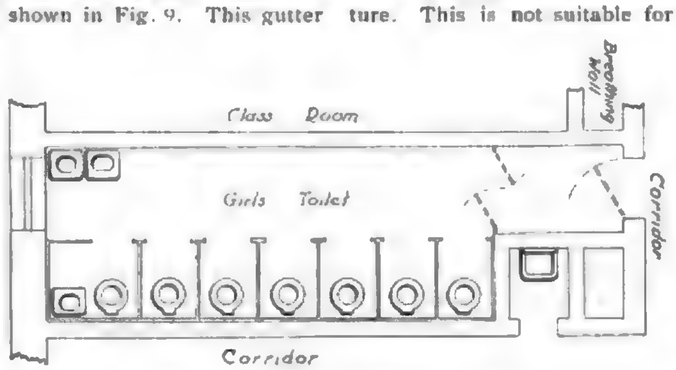


Fig. 7. Arrangement of Toilet on Upper Floor

As an improvement over this there is the tank which forms merely a receptacle for cracked ice and its melted water, together with a pipe coil through which the drinking water passes on its way to the faucet. In such a tank

dirty or impure ice may be used with impunity as there is no connection between the water in the coil and the water from the ice in the tank. The modified temperature is, of course, an advantage as water has been found to be most desirable for drinking purposes when about 50 degrees F. This scheme, however, is not desirable for schools as there is still the necessity of carting ice through the building while the coil is so small that it does not contain any reserve supply of cold water for a rush demand such as is likely to occur at a recess or lunch period.

If, however, all the drinking fountains are placed in the same relative position on each floor a small water pipe carried directly down to the basement from each group of fountains can be connected to a large coil of sufficient storage capacity for overload periods to properly meet the requirements.

To operate all drinking water from a central point some form of refrigeration and water circulation is required. Probably three-quarters of the refrigeration systems installed are of the ammonia type. The drinking water in a system of this kind must be circulated by a circulation pump so as to flow as continuously as possible to the various outlets. The outlets must be placed as near the circulating main as possible to avoid dead water in the pipe between the faucet or bubbler and the circulating main, and to avoid wastage in drawing this dead water off.

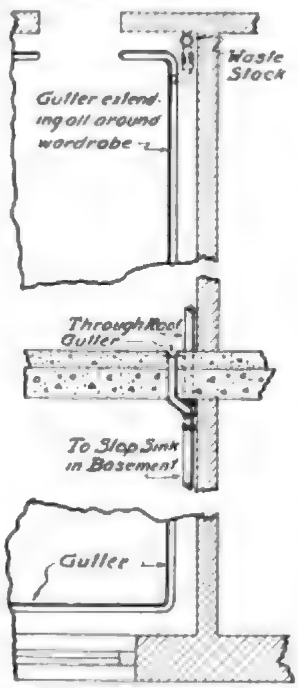


Fig. 9. Detail of Umbrella Drip Gutter

The fountains may be of the pedestal type which can be located upon the floor at any convenient point or of the type attached to the wall. In cases where single fountains are not sufficient to avoid undue expense the receptor type is generally used. This consists of a supply pipe running to bubblers which are opened by pressing down the hand wheel around the bubbler. The water from the outlets is caught in the receptor which resembles a common sink in every respect except the faucets.

It is difficult to understand why the waste from a school drinking fountain should be carried to a separate sink before entering the plumbing system as demanded in several localities, Pittsburgh, Pa., for instance. A drinking fountain trap connected direct to the plumbing system and properly vented introduces no more danger than drawing a glass of drinking water from the ordinary lavatory which is similarly connected.

Where shower baths are used positive means should be taken to avoid scalding. The best method is to do away with the hot water supply to the shower heads entirely and substitute a warm water line from a thermostatically controlled regulator to which hot and cold water lines are connected; the cold water connection to the showers is left as usual. Thus the pupil can obtain any temperature from the cold water up to the warm water temperature, but not over this. The warm water regulator is usually set at about 100 degrees F. and to avoid any possible complication due to tampering or failure to operate a thermostat can be installed in the warm water line so as to shut off this line absolutely if the temperature ever rises to the scalding point.

In biology rooms it has now grown to be the custom to have a small glass aquarium installed which is usually 24 to 30 inches wide, 36 to 54 inches long, and about 24 inches deep. Where such an aquarium is used it has been found a great convenience in changing the water to have water supply and waste connections provided. The water supply is most convenient when arranged with a special extended goose neck carried up and over one end of the aquarium with a stop cock such as is used on a common pantry sink. The waste connection may be either a standing waste (or a plug on a chain) the outlet being in the bottom of the tank; the standing waste is more serviceable as it provides an overflow connection and is easier to replace in the outlet if only part of the water is run off. If biology sinks are located nearby an easy method of disposing of the waste water in a sanitary manner consists of running the aquarium waste to the sink waste connecting thereto on the fixture side of the trap.

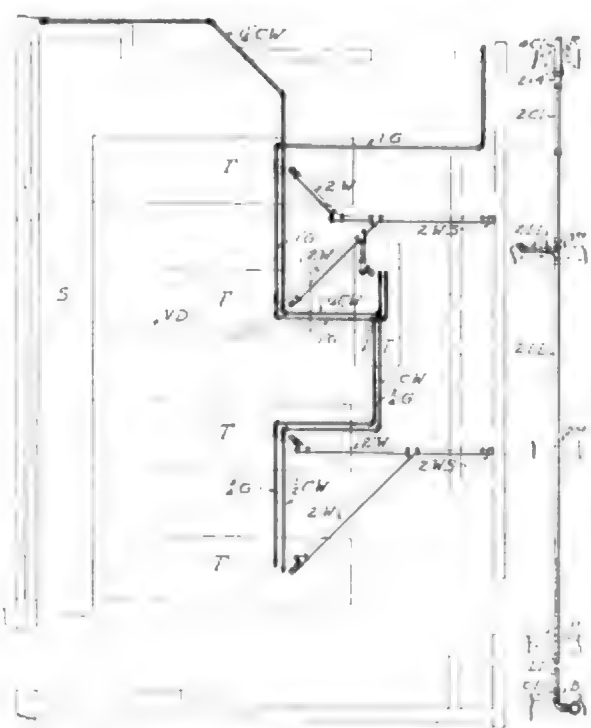


Fig. 8. Plan of Laboratory Showing Plumbing Arrangement

The foregoing covers the principal features of plumbing arrangements for schools and the methods cited are those which have been the result of much thought given to attaining practical and efficient installations. Although the improvement of recent years has been marked, it only indicates what can be done to perfect this work.

NEEDHAM PUBLIC LIBRARY, NEEDHAM, MASS.
JAMES H. RITCHIE, ARCHITECT

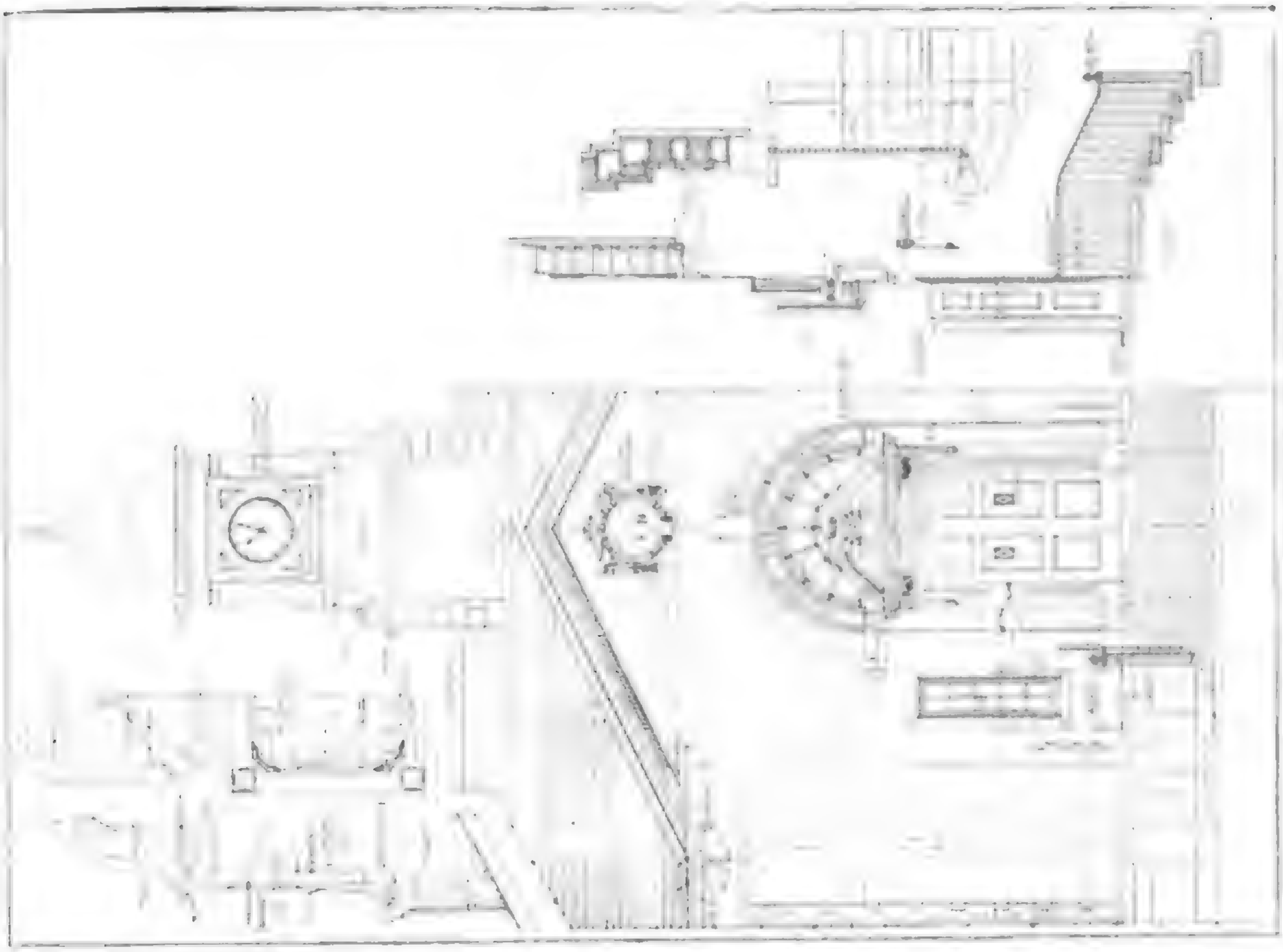
VIEW FROM REAR

BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

NEEDHAM PUBLIC LIBRARY, NEEDHAM, MASS.

JAMES H. RITCHIE, ARCHITECT



DETAIL OF ENTRANCE AND CUPOLA

DETAIL OF ENTRANCE

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INTERIOR, LOOKING INTO DELIVERY ROOM

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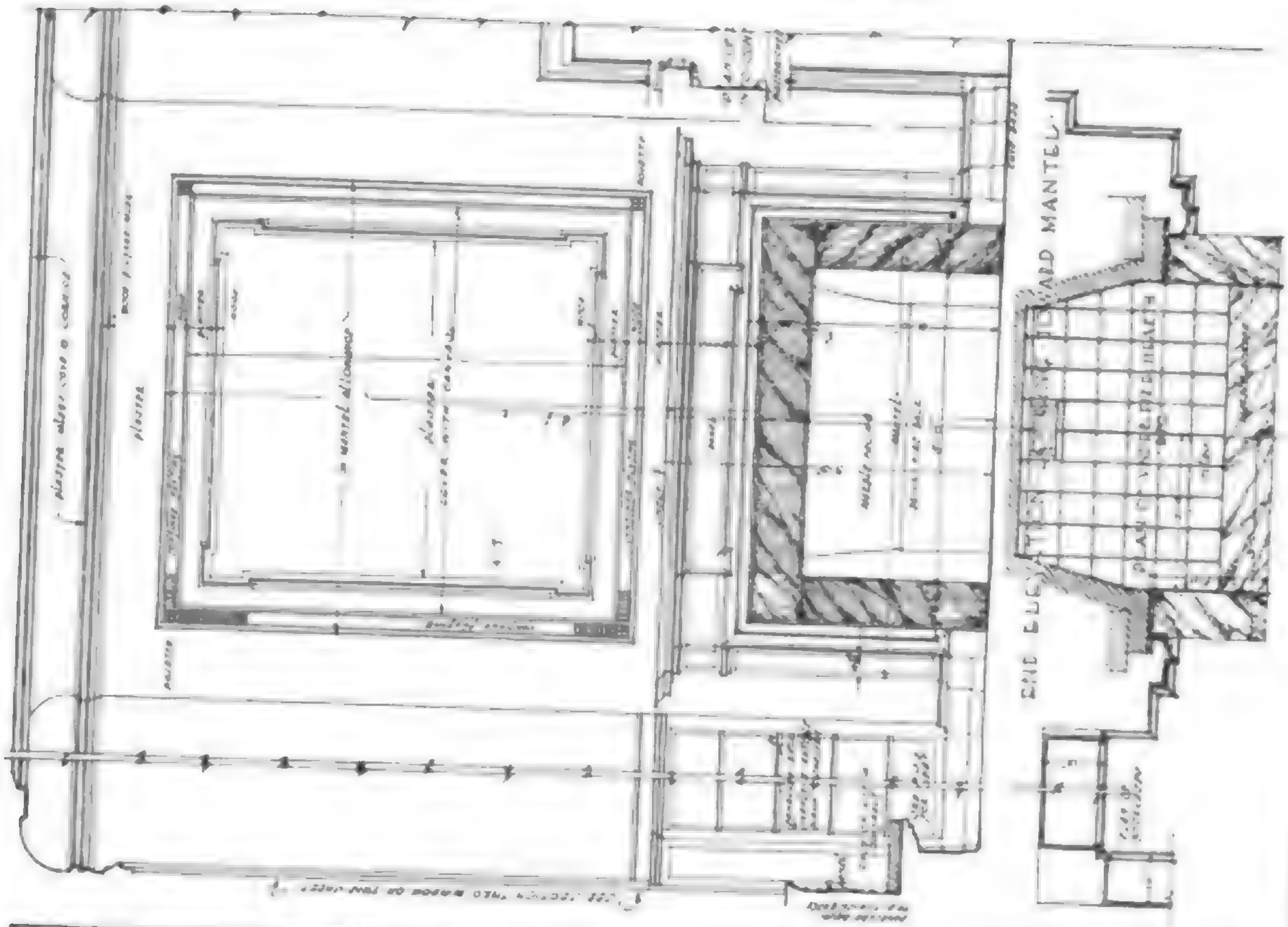

DETAILS OF MANTEL IN CHILDREN'S ROOM

NEEDHAM PUBLIC LIBRARY, NEEDHAM, MASS.

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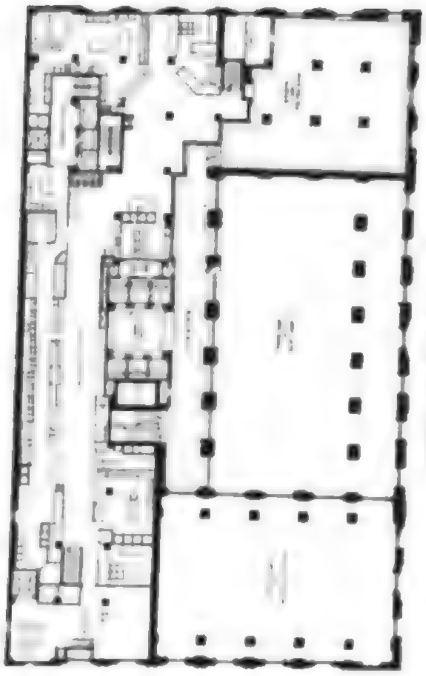
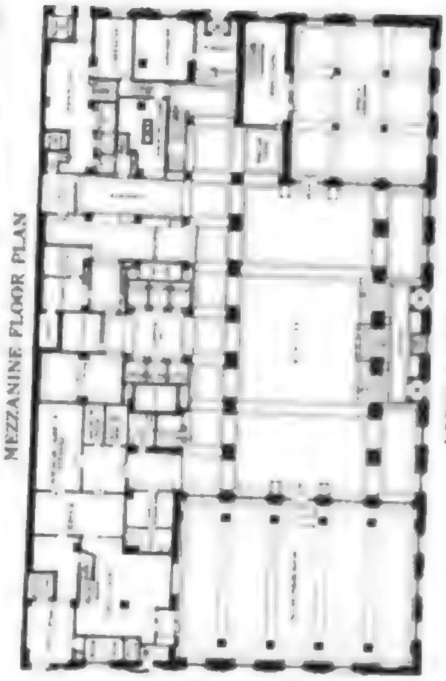
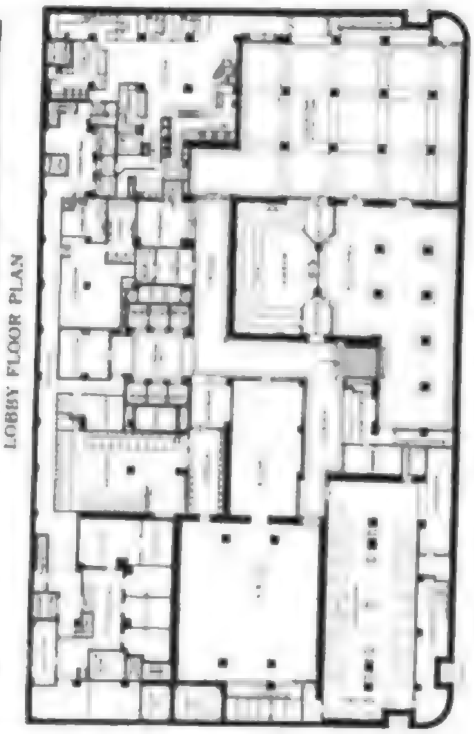


MEZZANINE FLOOR PLAN



LOBBY FLOOR PLAN

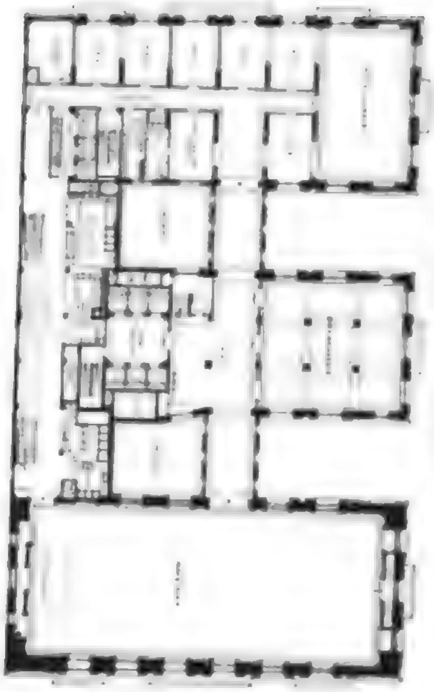


BASEMENT FLOOR PLAN

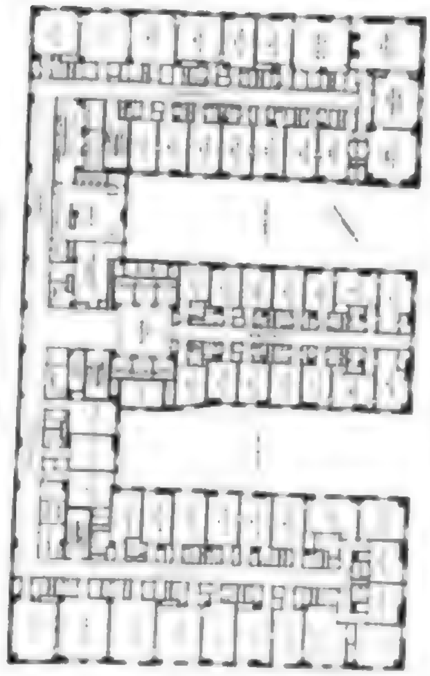
PERSPECTIVE DRAWING

WILLIAM PENN HOTEL, PITTSBURGH, PA.

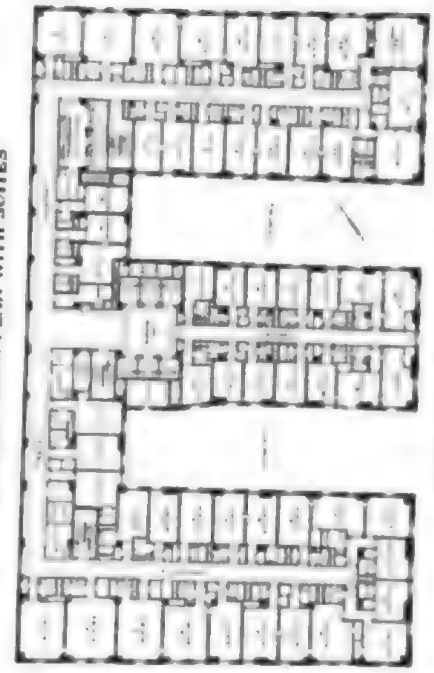
JANSSEN & ABBOTT, ARCHITECTS



BALLROOM FLOOR PLAN



TYPICAL FLOOR PLAN WITH SUITES



TYPICAL BEDROOM FLOOR PLAN

DETAIL OF LOWER STORIES AND ENTRANCE

WILLIAN PENN HOTEL, PITTSBURGH, PA.

JANSSEN & ABBOTT, ARCHITECTS

BALLROOM

ITALIAN DINING ROOM

WILLIAM PENN HOTEL, PITTSBURGH, PA.
JANSSEN & ABBOTT, ARCHITECTS

ENTRANCE TO VESTIBULE FROM LOBBY

ENTRANCE TO GEORGIAN DINING ROOM

WILLIAM PENN HOTEL, PITTSBURGH, PA.

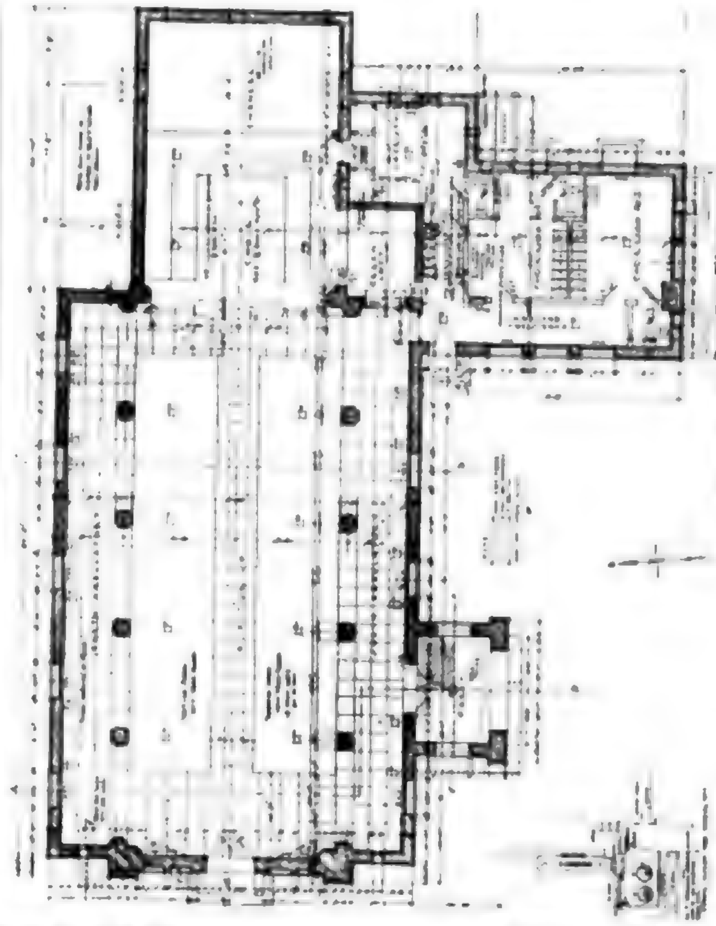
JANSSEN & ABBOTT, ARCHITECTS

GENERAL VIEW

INTERIOR LOOKING TOWARD CHANCEL

ST. JOHN'S EPISCOPAL CHURCH, LAUREL, MISS.

FRANK ARNOLD COLBY, ARCHITECT



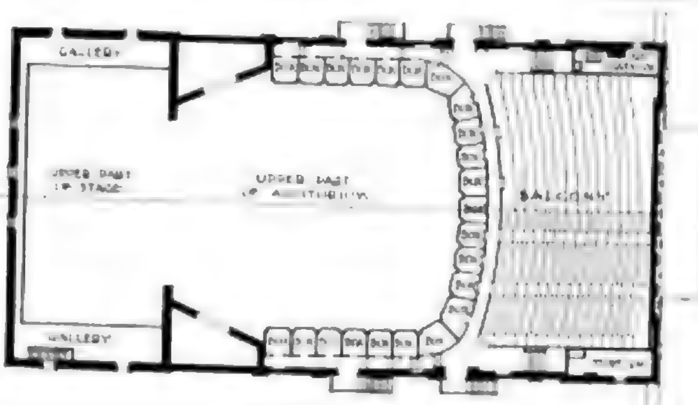
FIRST FLOOR PLAN

DETAIL OF PRINCIPAL FACADE

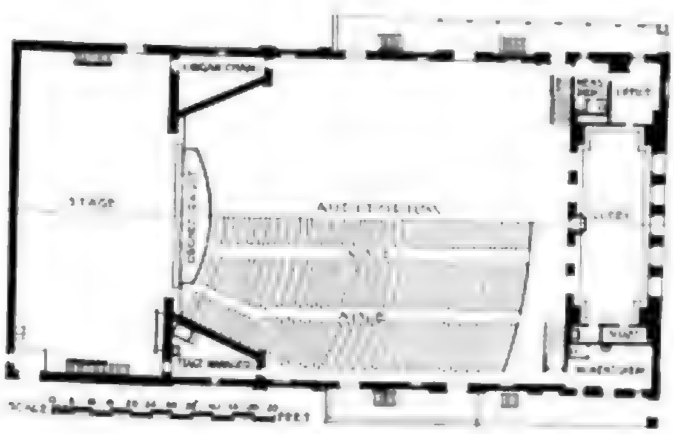
ST. JOHN'S EPISCOPAL CHURCH, LAUREL, MISS.

FRANK ARNOLD COLBY, ARCHITECT

GENERAL VIEW OF FACADE



BALCONY FLOOR PLAN



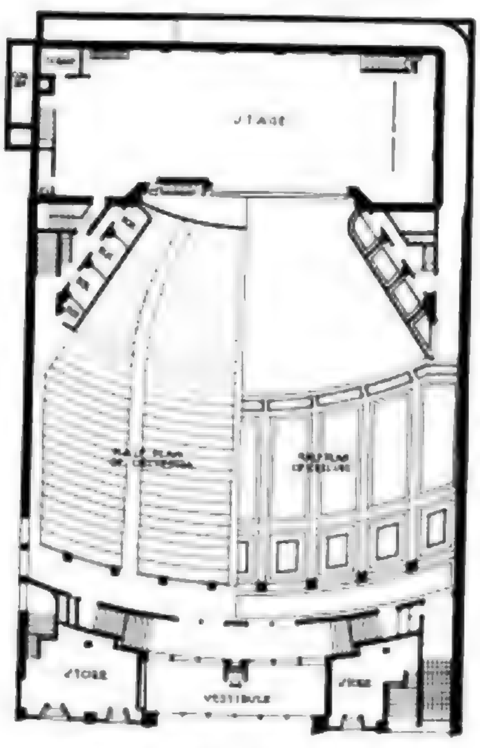
FIRST FLOOR PLAN

DETAIL OF FACADE

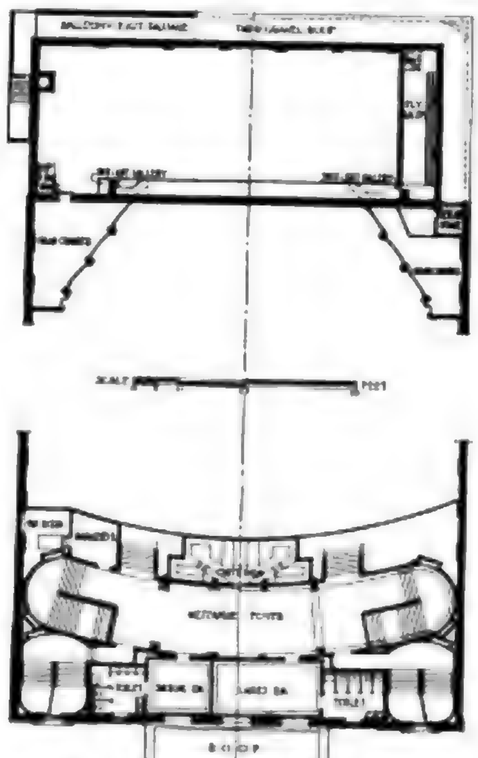
MOVING PICTURE THEATER, UTICA, N. Y.

GREEN & WICKS, ARCHITECTS

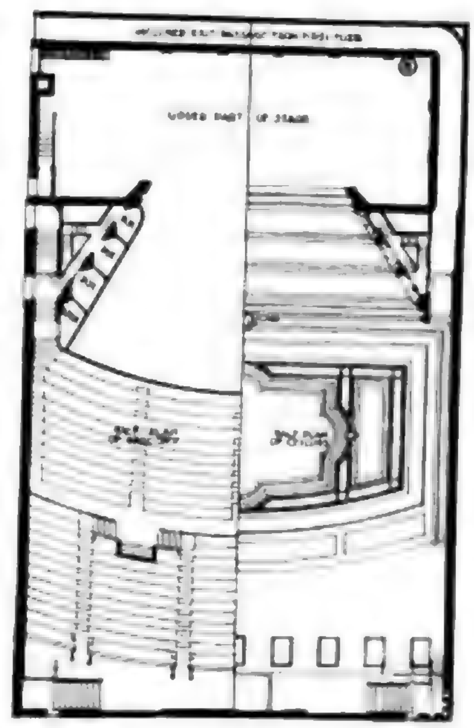
GENERAL VIEW OF EXTERIOR



FIRST FLOOR PLAN



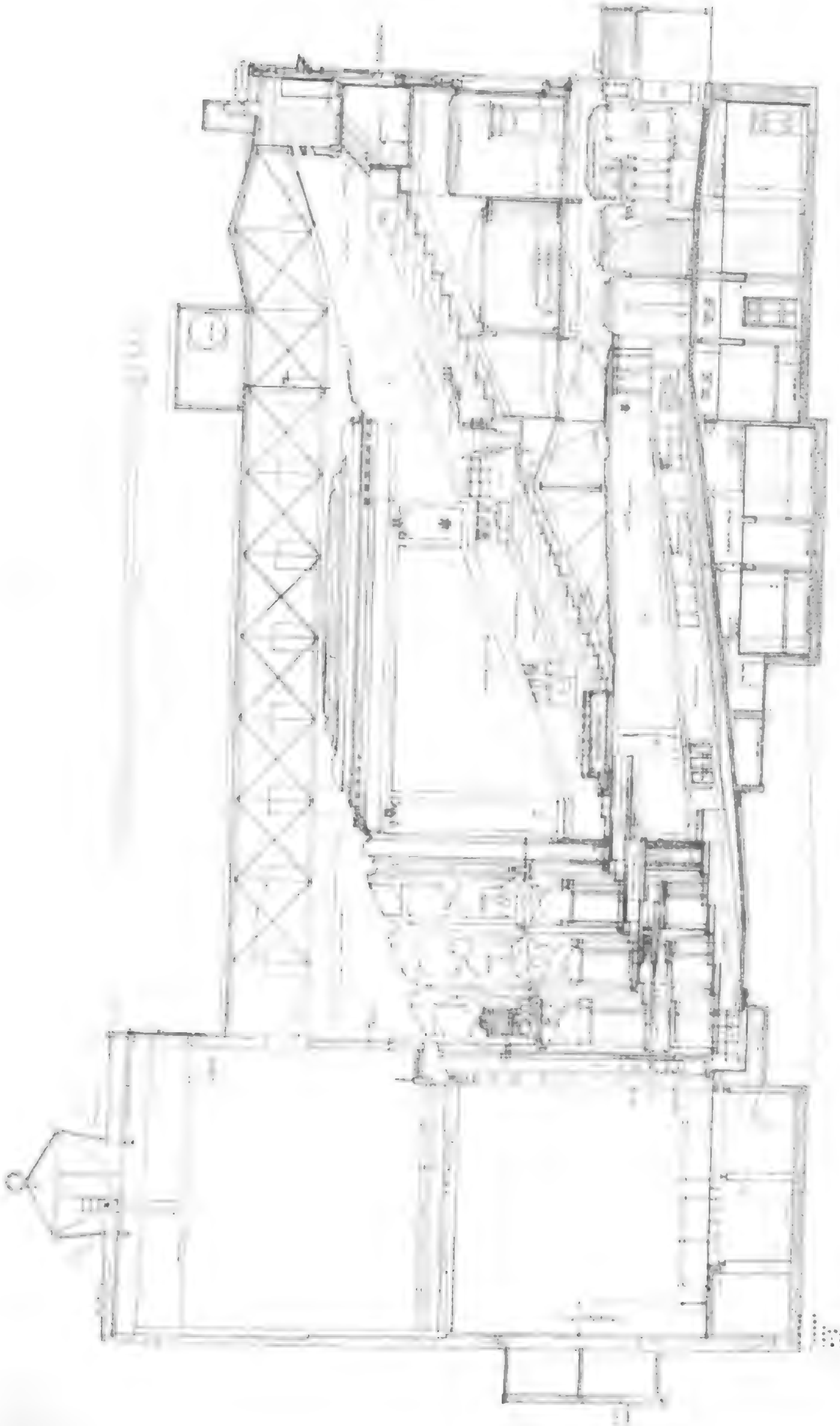
MEZZANINE FLOOR PLAN



BALCONY FLOOR PLAN

OLYMPIA THEATER, NEW BEDFORD, MASS.

WILLIAM L. MOWLL, ARCHITECT



LONGITUDINAL SECTION ON MAIN AXIS

OLYMPIA THEATER, NEW BEDFORD, MASS.

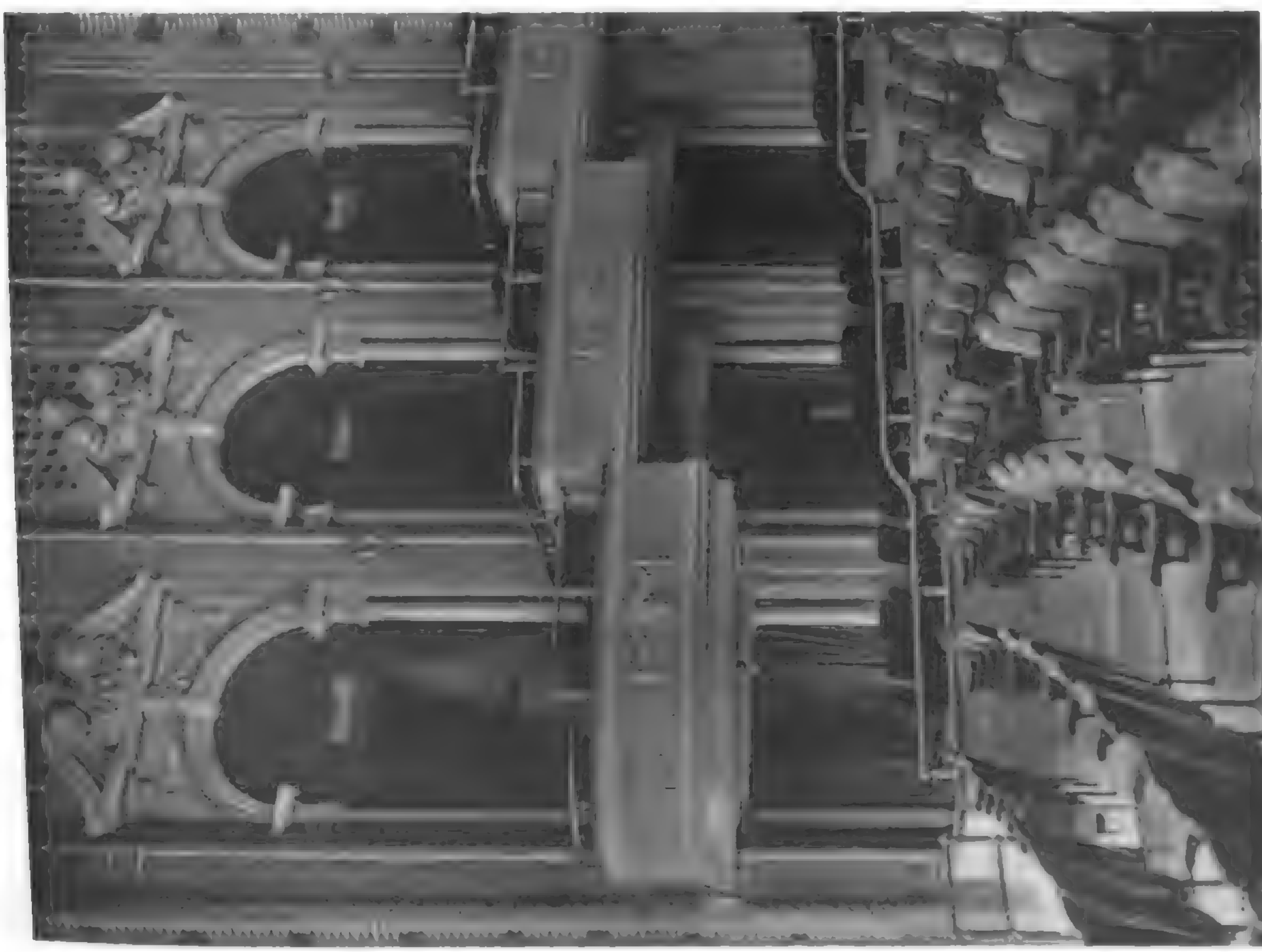
WILLIAM L. HOWLL, ARCHITECT

GENERAL VIEW OF INTERIOR FROM BALCONY

OLYMPIA THEATER, NEW BEDFORD, MASS.

WILLIAM L. MOWLL, ARCHITECT

VIEW OF BALCONY AND CEILING



DETAIL OF BOXES

OLYMPIA THEATER, NEW BEDFORD, MASS.
WILLIAM L. NOWLL, ARCHITECT

The Olympia Theater, New Bedford, Mass.

WILLIAM L. MOWLL, ARCHITECT.

View of Mezzanine Foyer

THE Olympia Theater is located on a lot, 100 by 163 feet, in the city of New Bedford, at the corner of Purchase and Elm streets. Purchase street on the front is nearly level; Elm street at the side rises from the front over 6 feet in the length of the building. The exterior of the building is built of white marble up to the belt course. Above this level the windows on the front are trimmed with marble and the lettering panel is marble. The remainder of the trim is of white matt glazed terra cotta and the body of the wall of water struck brick.

There are two small stores at the front of the building. The main entrance lobby is 40 feet wide, and beyond it is the stair lobby, with the main stairways at either side, to the mezzanine floor. On the orchestra floor there are thirty-two rows of seats with boxes at the front and a total seating capacity of about 1,400.

The balcony is reached by the main stairs to the mezzanine lobby. From this lobby open the retiring and toilet rooms, which are lighted by the large windows on the front of the building. The balcony is entered through two vomitories, which arrive at a cross aisle. This cross aisle feeds five aisles for the front portion of the balcony and four for the back, and is so arranged as to level that people using the cross aisle are below the sight lines of people sitting back of the cross aisle. It will be noted that these vomitories are placed with relation to the aisles in such a manner as to secure the most rapid distribution of those entering with the least amount of distance to be traversed. The balcony was designed with level rows of seats, which avoids the common difficulty of the tipping of the seats in the front rows at the corners of the balcony. The sight lines have been arranged so that every seat in the house commands an undisturbed view of the stage.

The general design of the auditorium was arranged for acoustic quality with the result that not only is it possible to hear well in the back row, 110 feet from the front of the stage, but also that in spite of the very deep overhang of the balcony (41 feet) there are no spots in the auditorium where it is in the slightest degree difficult to hear.

The exits have a somewhat unusual arrangement, due to the lot lines and grades. It should be observed that the passageway usually required by law, at the lot-line side of the auditorium, has been omitted. At this side there is an exit directly to the street in front and a passageway entirely around the back of the stage. This arrangement replaces the outside passageway without the sacrifice of seating area. From the balcony, which seats about 1,100, making the total capacity of the house 2,500, there are six possible means of egress—two stairways at the back, the vomitories, and two exits from the front corners of the balcony.

The stage is completely equipped for any kind of a modern theatrical production, although this theater is intended for the usual pictures and vaudeville. There is a complete outfit of rigging, including dead lines and counterweights.

The proscenium opening is 44 feet in width and 32 feet in height. Scenery is taken into the building by means of an incline from Elm street, which at this point is considerably above the stage level. The electrical equipment includes a very complete closed front switchboard, five borders, and a supplementary footlight in the center to ensure the satisfactory lighting of the center of the very wide proscenium opening. This center lighting is further supplemented by flood lights arranged under the front balcony boxes.

The basement under the stage has a boiler plant and property rooms. Under the auditorium are the dressing rooms, with every provision made for the comfort of the performers, including shower baths in the toilet rooms. The front portion of the basement contains manager's room, ushers' rooms, and so on, and retiring and toilet and check rooms. The heating and ventilating plant is most complete. The air is taken into the building over the roof of an exit passageway, passes through the heating coil and an air washer, and is introduced into the auditorium through

View of Vestibule

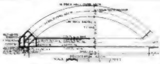
View Looking Down on Balcony Girders

View Showing Cantilever Balcony Trusses

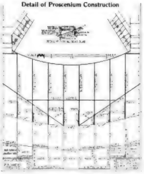
1,400 chair-leg ventilators distributed through the orchestra and balcony floors.

The picture booth is hung from the roof trusses against the front wall of the building. It is unusually large and contains two motor-driven picture machines of the latest type and the spot-light apparatus, together with the necessary electrical equipment, work bench, etc.

The building is of first-class construction throughout. The orchestra floor is of reinforced concrete carried on brick walls and concrete piers. The main walls of the building carry the roof trusses without steel columns. The balcony construction is somewhat unusual, as its very low pitch and considerable overhang did not provide depth enough for a girder 100 feet long to carry the cantilevers.

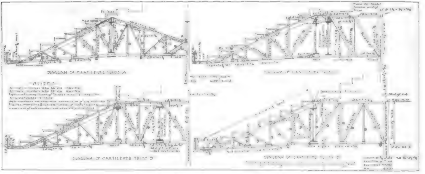


Detail of Proscenium Construction



Balcony Framing Plan

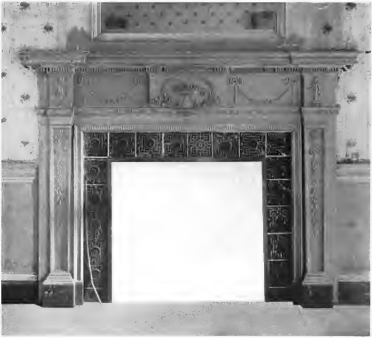
As shown in the diagram of the framing plan and the illustrations of this construction, two diagonal girders start from the two center columns at the back of the orchestra and run to the side walls, where they are carried on steel columns. Between these girders a cross girder is framed, and the cantilevers are carried on the diagonals and on this cross girder, thus making it possible to entirely avoid columns in the seating space. On this construction are the usual concrete treads and risers. Another detail of interest is the proscenium construction shown above in diagram. By the use of a brick relieving arch, the thrust of which is taken up by the steel built into the piers, the use of a deep girder was eliminated. The cost of the building completely equipped was about 22 cents per cubic foot.



Detail of Balcony Cantilever Trusses

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS.

PLATE TWENTY-FIVE.



A FEW hundred yards to the east of "Homewood," the house built by Charles Carroll in 1804, lies "Hunington," another famous southern house. Built about 1800 by James Wilson, it was the center of social activity in the early part of the century; but in late years it has fallen into decay, and will be torn down shortly to make room for rows of modern speculative houses. The delicacy and refinement of the detail that was used in this house is exceptionally well displayed on the mantel reproduced herewith.

Although all the surfaces are ornamented, there is no suggestion of the work being overdone. From the fact that some of the ornament on the mantel is found on work of an earlier date, one is led to believe that the house is older than is generally supposed. With the exception of this mantel, there is now little of interest in the house.

MANTEL IN "HUNINGTON," BALTIMORE, MD.

Built in 1800.

MEASURED DRAWING ON FOLLOWING PAGE.

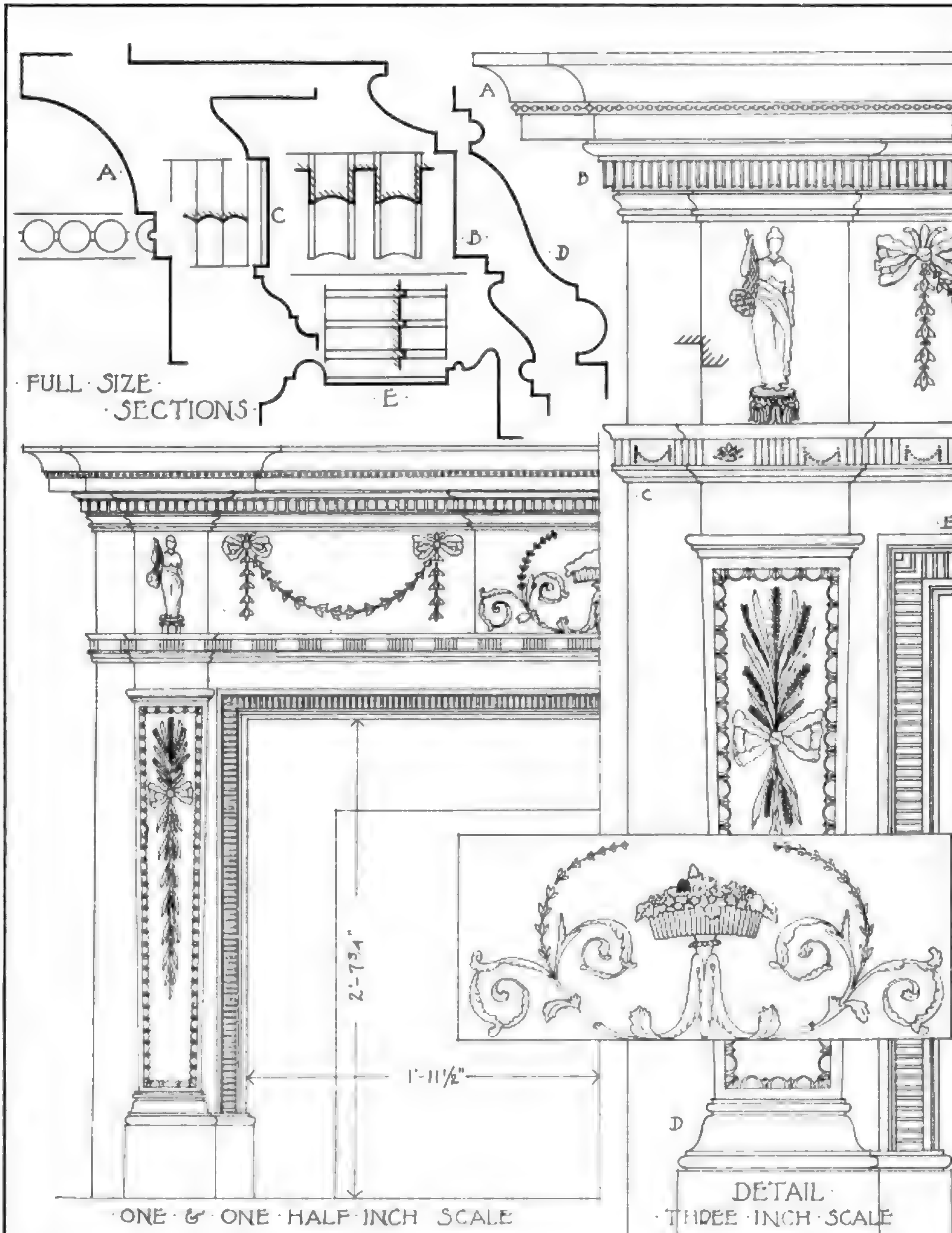


PLATE 25 JULY 1916	· MANTEL · IN · HUNINGTON · BUILT · 1800 · BALTIMORE · MD	· MEASURED & DRAWN · BY · RIGGIN · BUCKLER

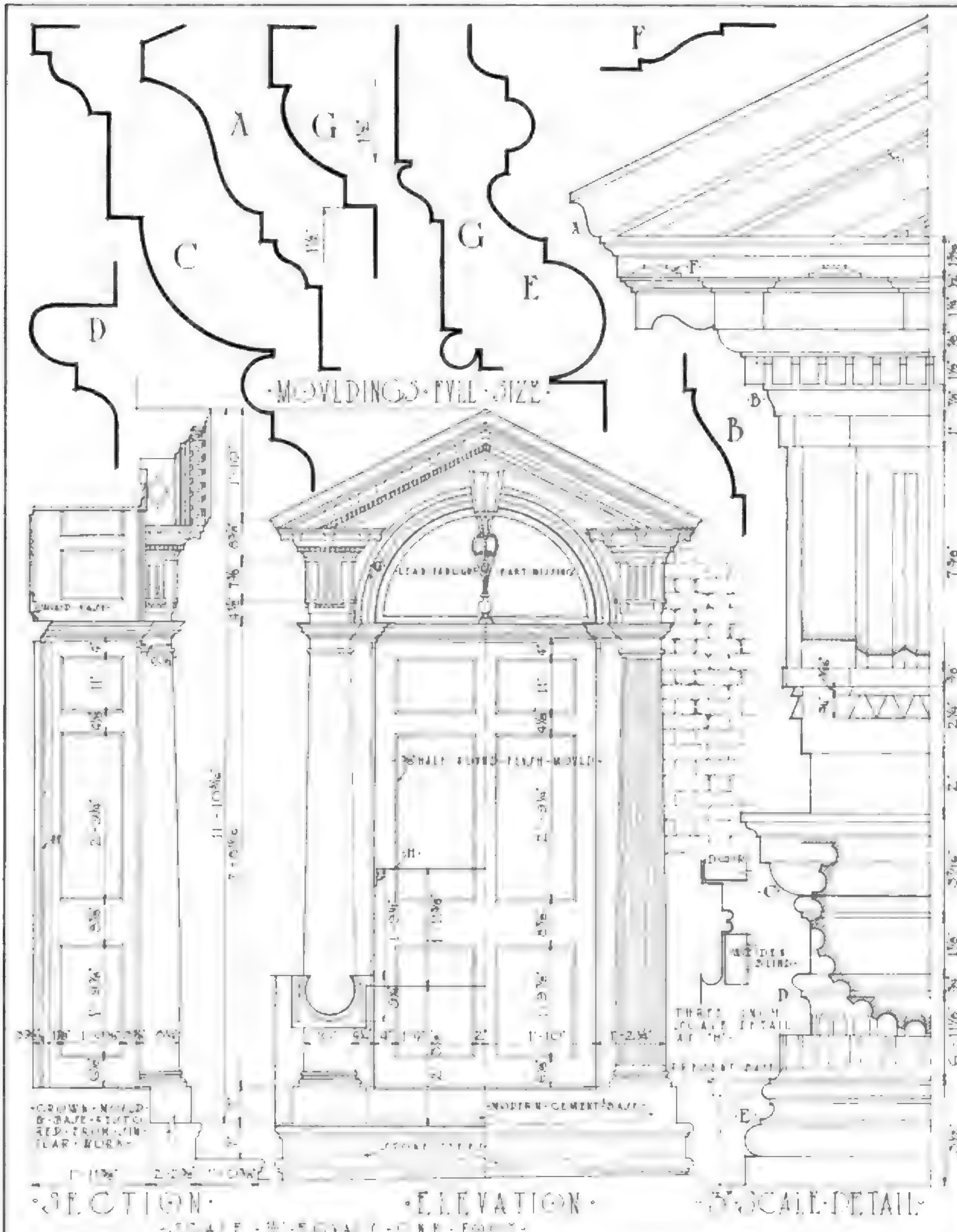


PLATE 26	·DOORWAY·114·S·FAIRFAX·STREET·	·MEASVRED·&·DRAWN·BY
	·ALEXANDRIA·VA·	J·L·KEUSTER·-·C·J·
JVLY 1916	DATE·ABOVT·1790· ·ARCHT·VNKNOWN·	MVNSON·&·J·DWEBER

PLATE TWENTY-SIX.

THIS elaborate doorway delights the eye with its perfect proportions and delicate mouldings. Note the daring manner in which the cornice bed-moulds have been brought out to the face of the column to show a wide soffit with a diamond shaped panel. The effect of the remaining ornament in the transom seems enhanced by the loss of the scrolls from either side.

DOORWAY, 114 SOUTH FAIRFAX STREET, ALEXANDRIA, VA.

Built about 1746

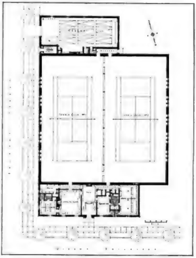
MEASURED DRAWING ON PRECEDING PAGE

Enclosed Tennis Court Buildings.

By WALTER D. BLAIR.

IN recent years the tennis champions of the Pacific Coast have defeated the best players of the East. This result has been partly attributed to the fact that on the Pacific Coast tennis is played during the twelve months of the year. To overcome the difficulties of winter climate, the writer has recently, upon three occasions, been commissioned by tennis enthusiasts to build covered tennis courts in which tennis could be played irrespective of rain, snow, or frost.

As the problem is elementary in its simplicity, the building of the Pastime Tennis Company, located in New York City, has been selected to illustrate the solution. The construction of such a building is not confined to this particular type, however, as evidenced by two other buildings recently erected. In one at Jekyl Island, New York, the roof trusses are of wood, the exterior walls of brick with stucco exterior surface, and the roof hipped so as to make the structure as low as possible. A second building, located at Mt. Kisco, New York, is situated in a wooded section and is entirely of frame construction, with shingle exterior stained green, and doors, cornice, and window trims painted white. The building illustrated herewith occupies a city lot and is built to the street line. Its roof trusses are of steel, the exterior of brick and limestone, and the interior walls furred with terra cotta tile and covered with cement stucco, troweled smooth.

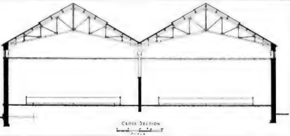


Main Floor Plan

Enclosed Tennis Courts Building, Queens Boulevard, Long Island, N. Y.

Walter D. Blair, Architect

View of Interior, Showing One Court



Cross Section through Structure over Courts

Packard Street Elevation

Enclosed Tennis Courts Building, Queens Boulevard, Long Island, N. Y.

In playing tennis indoors the players should not be conscious of the enclosing walls and roof. To accomplish this result 10 feet in the clear beyond the side lines, although 11 feet is better, and 20 feet back of the base line are sufficient. This gives a room 56 by 118 feet. In the first of the buildings mentioned the spring of the roof trusses was placed 26 feet above the court and the bottom chord of the truss inclined upward 7 feet, so that over the center of the court there was a clear height of 33 feet. This was found amply sufficient for lobbing, and these dimensions were not increased in the later buildings.

In each of the buildings ventilation is given by windows on the side above the line of vision and by movable sections of the skylights.

The lighting should be from overhead and abundant, so arranged that the effect is similar to playing outdoors on a gray day. One of the unexpected results of these buildings has been the absence of eye strain, which is always present when one plays outdoors on account of the excessive light. At Jekyl Island, where the atmosphere is without any smoke and the sun directly overhead, the skylights have an area in section of 1,092 square feet; at Mt. Kisco the area is 1,734 square feet; and in the building illustrated, where the atmosphere is darkened by city conditions, the area is 2,856 square feet.

The interior walls of the latter building up to a height of 21 feet are painted a gray green, and above that level the walls, ceiling, trusses, and all other surfaces are painted a light gray. The court itself is built of an English clay, which has the merit of never packing so hard that a cut ball loses its break. Ordinary American clay can, of course, be used, and will give the hard, fast surface

DETAIL OF MAIN ENTRANCE

ENCLOSED TENNIS COURTS BUILDING, QUEENS BOULEVARD, LONG ISLAND, N. Y.

WALTER D. BLAIR, ARCHITECT

that is familiar to all. It will not require as much watering or care as the English clay nor cost as much.

The court is marked by lead tapes which are fastened to the clay by long nails. The posts are removable and set in cast-iron sockets which are incased in concrete.

Heating is supplied by radiators recessed in the side walls and by coils under the skylights. The supply mains run around the outside walls in a heating trench which is covered with removable concrete slabs set flush with the court.

For artificial lighting an indirect system is undoubtedly the best, if the owner is willing to pay the extra cost of installation and maintenance. The underside of the roof can readily be designed to give the proper reflection surface. If direct lighting is used and the lights are placed at the roof level along the outside walls, the player will not be annoyingly conscious of the source of illumination.

As the number of rooms accompanying the tennis court—locker, shower, lounging, and service rooms—is dependent upon the particular demands of the owner, each building in this respect becomes a particular problem and no general suggestions concerning their arrangement or size can be made that will be applicable in all cases.

Doorway from Hall to Lounging Room

View in Lounging Room

Enclosed Tennis Courts Building, Queens Boulevard, Long Island, N. Y.

Competition for a One-Family House.

REPORT OF JURY OF AWARD AND PRESENTATION OF PRIZE AND MENTION DESIGNS.

AFTER careful consideration of the designs submitted, the judges of this competition have made the following awards:

The *first prize*, of $500, is awarded to W. L. Risley and James Perry Wilson, Newark, N. J.

The *second prize*, of $250, is awarded to William G. Rantoul, Boston, Mass.

The *third prize*, of $150, is awarded to Austin Whittlesey, New York, N. Y.

The *fourth prize*, of $100, is awarded to J. Ivan Dise, New York, N. Y.

Honorable Mention is given to George F. Blount and William J. Mooney, Boston, Mass., Alfred Cookman Cass, New York, N. Y., Antonio di Nardo, New York, N. Y., Erik Kaeyer, Yonkers, N. Y., E. J. Thole, Evansville, Ind., Lewis E. Welsh and J. Floyd Yewell, New York, N. Y.

In arriving at their decisions the judges gave first consideration (as required by the conditions) to the excellence of the design and its fitness to the material employed; and second, to the excellence of the plan. Accordingly, designs which relied for their effectiveness on a rational use of the prescribed material were in general preferred to those which derived their distinction or charm from other sources. On account of the limitation of cost (a paramount consideration), plans which were compact and with few angles were in general preferred over those which showed a tendency to "sprawl."

The judges questioned both the possibility and the advisability of building either of the side walls on the lot line, as in most cities there exist restrictions which limit this privilege; but as the conditions contained no prohibition, it was assumed that the competitor had a right thus to place his building if he chose.

The elements of charm, of unity, of harmony, were given a high value by the judges, because these are things which our small house architecture most conspicuously lacks. On the other hand, a straining for mere picturesqueness for its own sake was not encouraged.

The elements of *livableness* in the plans — that is, the presence of those factors which make for beauty and dignity, "sweetness and light" — were given a high value, because, again, this matter is not sufficiently considered in houses of this class. It was the opinion of the judges that this livableness could be achieved best by turning the face of the house to the garden rather than to the street, because so aspected it was assumed that no family could continually tolerate the sight of the usual American back yard; they would perforce make a garden of it — an outdoor living room. The judges were fully aware that in taking this view of the matter they were ignoring a well known fact of American psychology: that "the man on the street" — and the female of his species even more — loves the street. With them the joys of privacy give place to the desire to see everything that is going on.

THE FIRST PRIZE DESIGN. Because the design of Messrs. Risley & Wilson appeared to the judges to be the most complete embodiment of an ideal realized within the limits of the given conditions, it was awarded first prize. The house, they imagine, would be charming to look at and delightful to live in. It is a plan which conduces to "dignity" of living. A loggia for summer days, an ingle for winter nights, convenience, space, privacy — these factors all appear in the achieved result. The design is simple, direct, appropriate to the material, and withal distinguished and original. The authors have an evenly balanced talent; their house is well planned, well designed, and well presented.

Although the judges were unanimous in awarding Messrs. Risley & Wilson's design the first prize, they were keenly, even painfully, aware of all the easily anticipated criticisms launched by the unofficial juries in how many thousand drafting rooms where THE BRICKBVILDER punctually appears. And these juries the judges would address somewhat as follows, answering only a few of their objections:

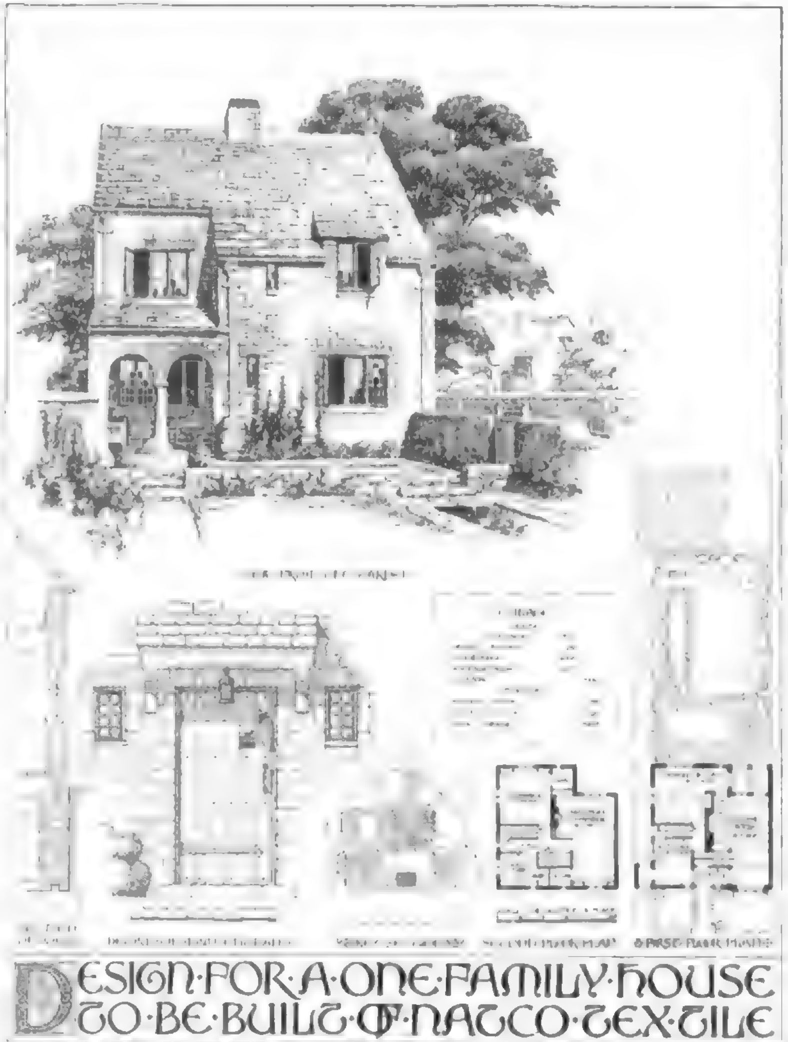
It is true that the successful prosecutors have given only a hint of the appearance of their house from the street, where it would be best and oftenest seen; yet a careful study of the plan would indicate that they have considered its street aspect, and with their unquestioned talent for design it is fair to assume that they could impart to the front an equal, though a different, beauty.

It is true that two stairways in a house of this size eat up valuable space, and yet the added privacy gained in this way is precious to persons given to the cultivation of the art of life.

It is true that only two bedrooms on the second floor presuppose the smallest of small families, and yet under the conditions such an assumption as this is permitted. What one finds it harder to forgive is that in the bigger bedroom there is no good place for a bed! Were the plan the paramount consideration in this competition, these matters would have loomed larger in the minds of the judges. What the prize winners have evidently aimed to do is to provide a habitation, not for the average, but for the exceptional individual, and in this, in the opinion of the judges, they were quite within their rights so long as they played the game according to rules.

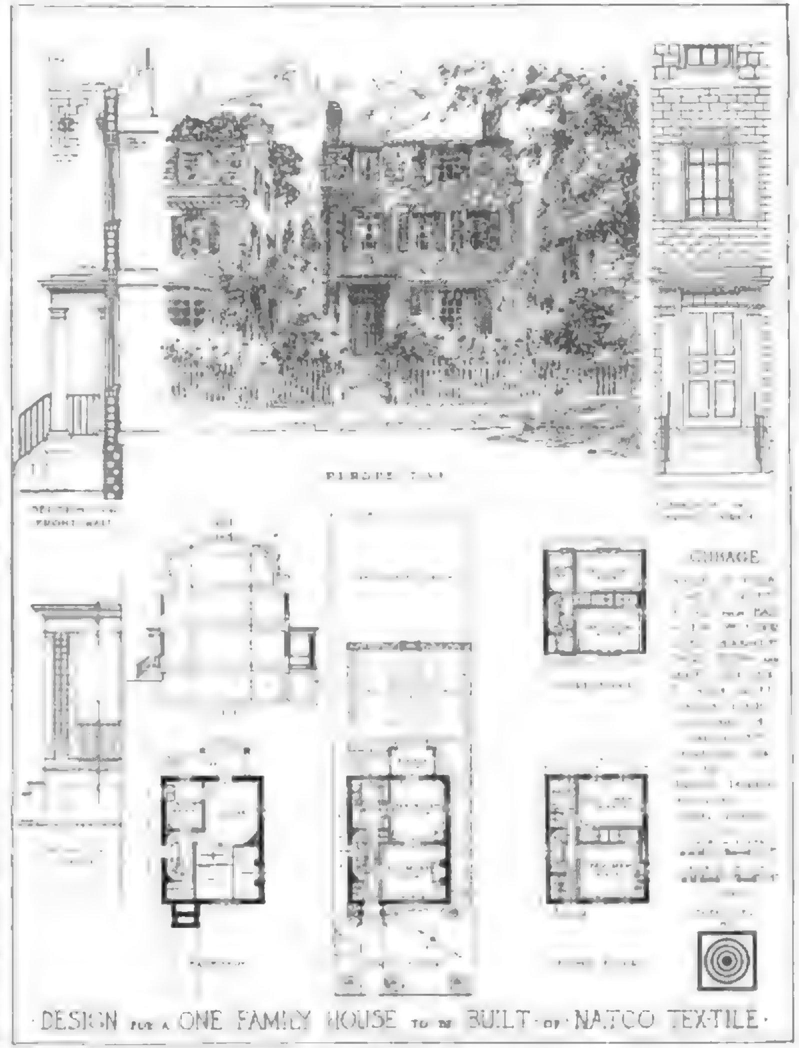
THE SECOND PRIZE DESIGN. Mr. Rantoul's design, treated in so different a spirit, has the high merit of perfect directness and consistency. The face which the little house presents to the street is frank and charming, and in a high degree expressive — expressive of the material, of the interior arrangement, and of a native grace and refinement.

Mr. Rantoul postulates for himself an entirely different sort of a client from that of Messrs. Risley & Wilson —



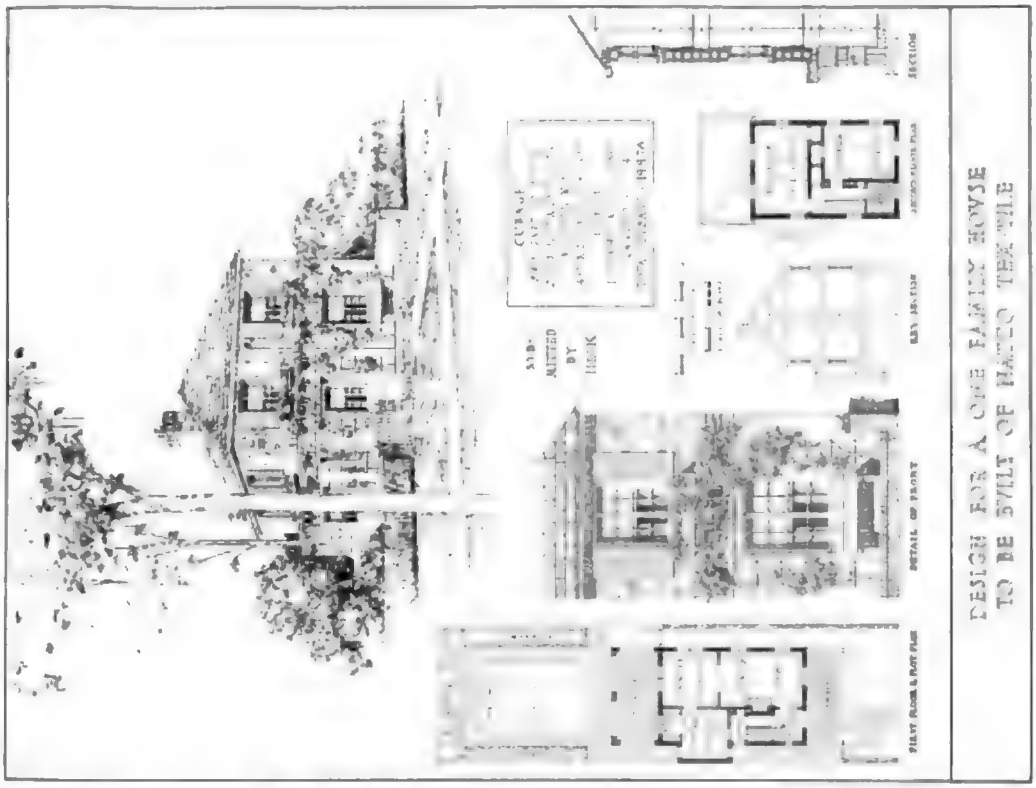
FIRST PRIZE DESIGN

SUBMITTED BY W. L. RISLEY AND JAMES PERRY WILSON, NEWARK, N. J.



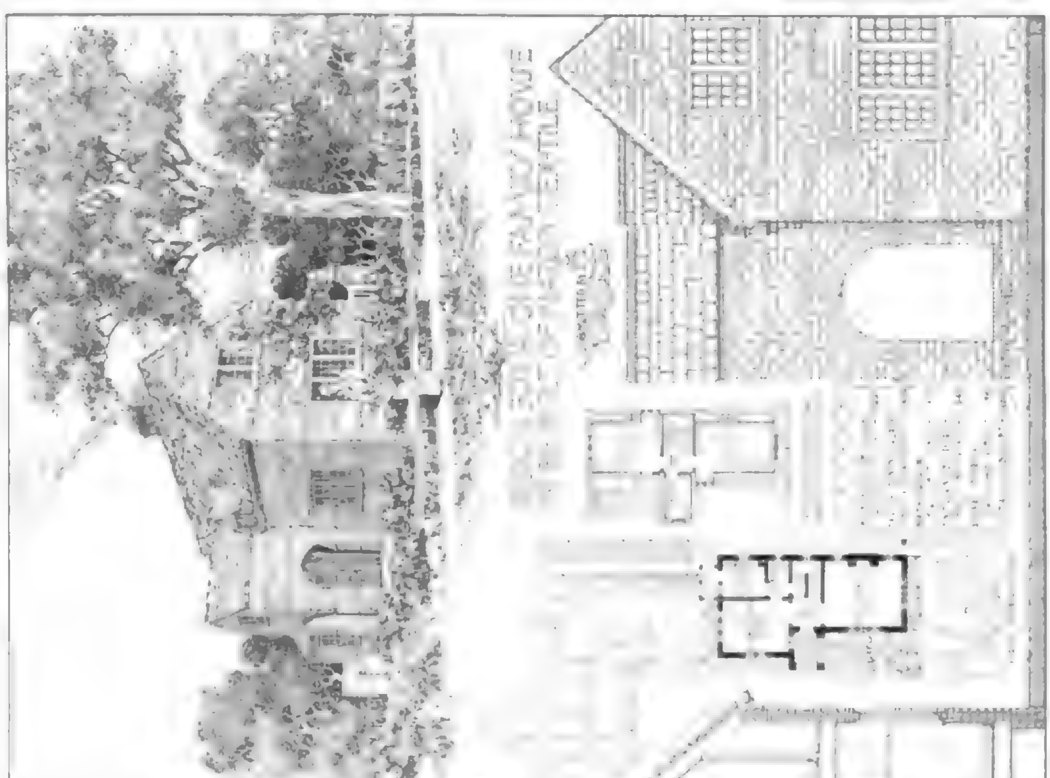
SECOND PRIZE DESIGN

SUBMITTED BY WILLIAM G. RANTOUL, BOSTON, MASS.



FOURTH PRIZE DESIGN

SUBMITTED BY J. IVAN DISE, NEW YORK, N. Y.

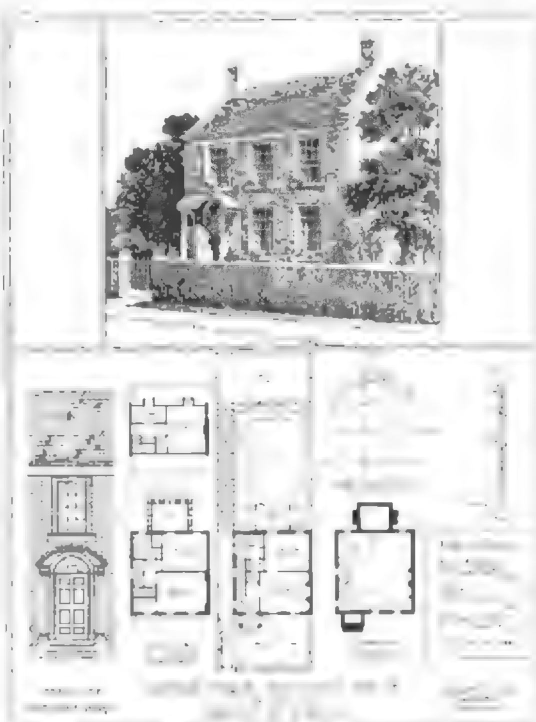


THIRD PRIZE DESIGN

SUBMITTED BY AUSTIN WHITTLESEY, NEW YORK, N. Y.

one who wants absolutely the most that can be got for the money, not in novelty and æsthetic interest, but in accommodation. Occupying less space on the ground than any of the other plans, it exceeds them all in the number of rooms. This is achieved by a vertical extension. It is a device of the highest economy, though fraught with perils for the designer. The facility with which these perils have been avoided in this instance proves his high competence. All the judges agreed to his title for second place. The stairway is a bit too cramped, and the living room too small for comfort. It would have been better to have omitted the fireplace in the dining room, and by a broad opening between it and the living room obtained a single large room susceptible of temporary subdivision for its double function.

The rendering of this design is extraordinarily competent and charming.



Mention Design
Submitted by Alfred Cookman Cass, New York, N.Y.

THE THIRD PRIZE DESIGN. Mr. Whittlesey's design has the merit of simplicity and domesticity, besides exhibiting an admirable sense of the proper handling of material. There is no applied ornament, and no need for any, the materials themselves being treated in so honest and so interesting a way. The position of the dormer in the valley is unfortunate and, as it happens, unnecessary; while in the northern latitudes the placing of the bathroom above the porch would probably impoverish the owner at the expense of the plumber. Too much space has been sacrificed in the bedrooms for the sake of the low studded effect. Another foot added to the height of the walls would not have harmed the design in the least. The arrangement of rooms is good, the rendering excellent, though such sylvan surroundings are scarcely warranted by the conditions which, by calling for a house on a thirty-foot lot, clearly imply a street of similar lots.

THE FOURTH PRIZE DESIGN. Mr. Dise's design is what may be described as a "usual" type, but somehow saves itself from being commonplace, nevertheless. One finds a certain satisfaction in its four-square façade, its low, untroubled brow, its open, candid eyes. The whole thing is another illustration of the adage, "An honest tale speeds best being plainly told."

The plan has the merit of economy and directness and the rendering is beautifully brilliant.

THE HONORABLE MENTION DESIGNS. The trim, prim, Georgian bijou by Mr. Cass would grace Pomander Walk itself. There is a lasting charm in this sort of thing which cannot be gainsaid. Under the conditions, however, it could not be given as high a place as those designs which depend less on detail and more on material and mass. In language, the untranslatable idiom is the most precious, and in architecture the same thing holds true. The merit of the prize designs — notably the first and third — consists in the fact that they are so evidently conceived in the prescribed material and no other, while Mr. Cass' house could be translated into shingle, stone, or stucco, without the change of a phrase.

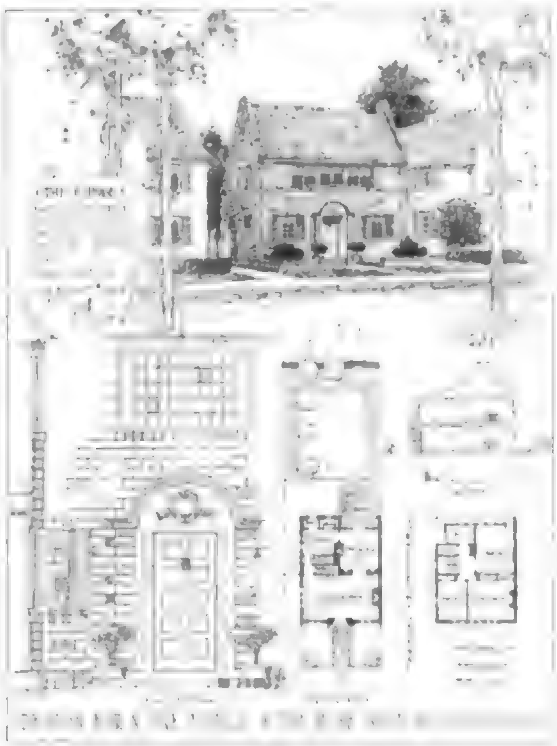
The plan is economical and practical, though rather commonplace; the rendering is colorful, conveying a sense of reality seldom achieved in pen-and-ink work, because so difficult to achieve.

Mr. Kaeyer's design is better than appears at first glance; his rendering is singularly hard and without charm, and does the house rather less than justice. It is a thoroughly good solution of the problem, and the plan is in many respects the best among the ten here presented.

The design of Mr. Blount and Mr. Moody shows an intelligent use of material and a happy disposition of voids and solids. But in a village or city to plump from the street into the middle of the only living room is an intolerable sin against comfort and privacy. For summer places in the country, where drafts are welcome and visitors infrequent, this criticism loses something of its force, but it is not such a house we are considering in this competition.

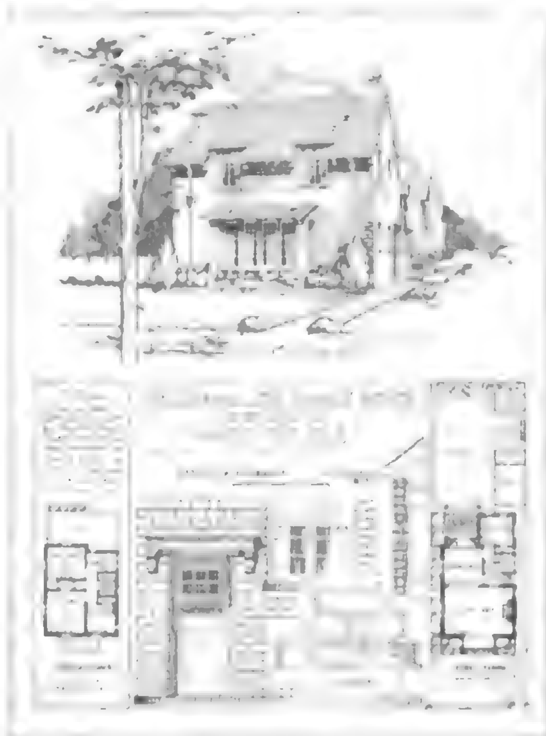
Mr. di Nardo's design is beautifully direct, simple, and harmonious. The plan is less admirable. The hall is larger in proportion than the size of the house warrants, the dining room is too narrow, and the placing of the house in the length of the lot has little to recommend it when one considers the probable location of the adjoining houses.

The design of Messrs. Welsh & Yewell is of such a seductive charm and picturesqueness that the judges had to sharpen their critical faculty to a fine edge to resist its blandishments; if the view had happened to be from the side not shown in perspective, it is clear that these would have been less. Justly or not, the judges came to feel that this house was designed too wholly with a view to its effect from the particular angle chosen, and that it depended too much upon its surroundings and accessories. Moreover, it is improbable to them that it could be built within the limit of cost. In imaginative quality, in feeling for line, mass, and proportion, the competition has nothing better to show; but as a practical solution of a practical problem this house could not be given as high a rank as the premiated designs.



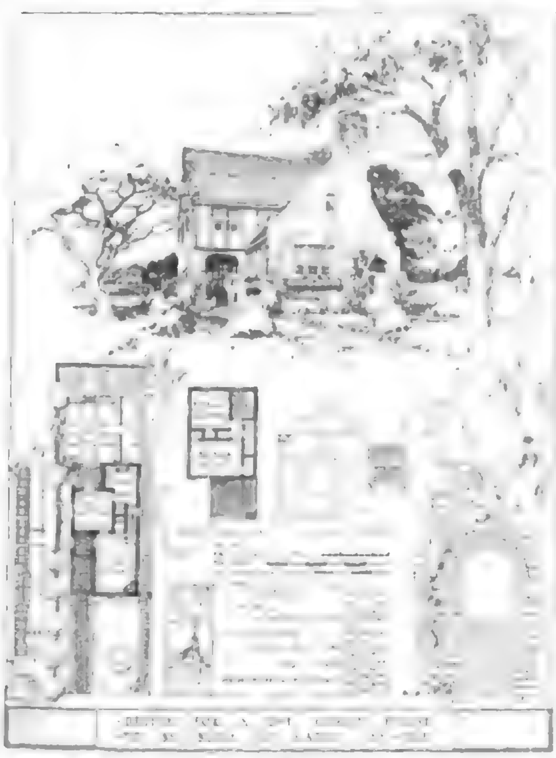
MENTION DESIGN

SUBMITTED BY GEORGE F. BLOUNT AND WILLIAM J. MOONEY
BOSTON, MASS.



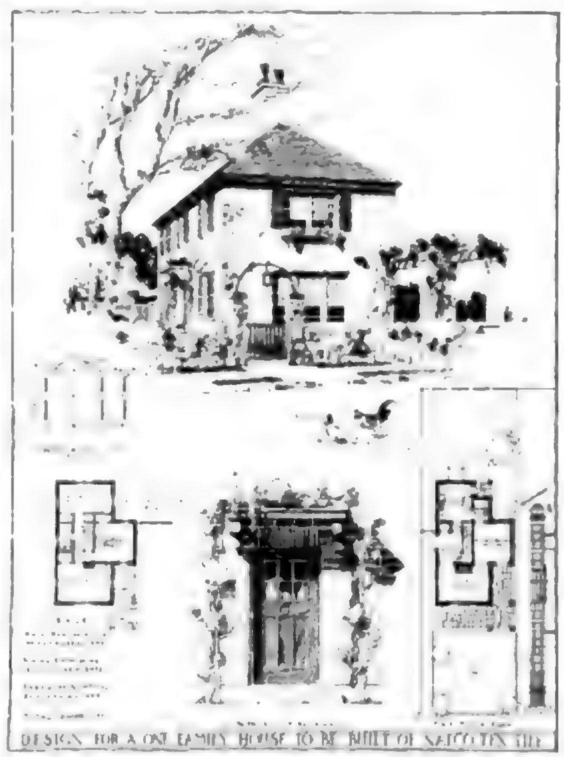
MENTION DESIGN

SUBMITTED BY ERIK KAEYER, YONKERS, N. Y.



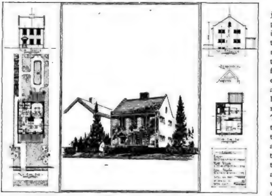
MENTION DESIGN

SUBMITTED BY LEWIS E. WELSH AND J. FLOYD YEWELL
NEW YORK, N. Y.



MENTION DESIGN

SUBMITTED BY ANTONIO DI NARDO, NEW YORK, N. Y.



Mention Design
Submitted by E. J. Thole, Evansville, Ind.

Mr. Thole's design is, on the whole, so admirable that one wishes he had given a little more study to the pediment over the entrance door, which is somehow painfully *malapropos*. The side, too, seems different in character from the front. Yet, despite these blemishes, Mr. Thole's design shows a grasp of the essentials of his problem, and his place in the honor list is well deserved. The rendering is skilful; if a bit uncertain where to leave off, the author at least has shown in his drawing that he knew the value in pen-and-ink work of blank spaces and strong shadows.

In conclusion, the judges desire to express to the competitors their regret that in the mass of material submitted the many flashes of felicity, the many excellences of achievement, should have to pass unnoted in this report. To the publishers they desire to extend their thanks and felicitations on the management of the competition: and to the company, which made the competition possible, they wish to express their appreciation of a policy which not only encourages effort and develops talent among architectural draftsmen, but which conduces to better living conditions throughout the land.

Claude Bragdon, Rochester, Alfred Busselle, New York, Charles Herrick Hammond, Chicago,
William Gray Purcell, Minneapolis, Ernest John Russell, St. Louis,
Jury of Award.

VIEW OF BALLROOM FLOOR LOBBY

VIEW OF BALLROOM FLOOR RECEPTION ROOM

WILLIAM PENN HOTEL, PITTSBURGH, PA.
JANSSEN & ABBOTT, ARCHITECTS

PLATE DESCRIPTION.

Needham Public Library, Needham, Mass. Plates 97–101. This library building replaces two smaller libraries maintained in separate parts of the town and is situated in a central location to serve the interests of the citizens formerly provided for by the two.

The foundation walls are of concrete below grade with cast stone exterior surface above grade, including the entrance steps. The exposed surfaces are fine crandalled, closely resembling cut granite. The water table, panels under the windows, which are modeled to represent the seals of important modern publishers, the arch stones, etc., are of Vermont marble. The cornice is white painted wood as is also the entrance doorway; the roof is slate.

The woodwork throughout the interior is white pine, painted with five coats and rubbed down to an egg-shell gloss, and the floors are of oak. The furniture with the exception of the library stacks and lighting fixtures was designed by the architect.

William Penn Hotel, Pittsburgh, Pa. Plates 102–105. The William Penn Hotel is bounded by William Penn place on the north, Sixth avenue on the east, and Oliver avenue on the west, with frontages of 216, 130, and 130 feet, respectively. The plan is in the shape of a letter E with the two courts opening on William Penn place. The location is a central one, but the streets are so narrow that it is not possible to obtain a photograph of the entire building. The reproduction of the rendered perspective furnishes a good impression of the completed building, however. The body of the building is faced with brick with terra cotta trim, the upper floors and cornice having an elaborate and dignified treatment in terra cotta. The lower floors are of Indiana limestone with terra cotta for the decoration of the window reveals.

The principal feature of the ground floor of the hotel is the large lobby, which is entered directly through a vestibule from William Penn place. To the right as one enters the lobby is the Georgian dining room and to the left the main or Italian dining room, each of these rooms being separated from the main lobby by glass screens so that there is a fine sense of openness on this floor. The elevator hall is directly opposite the main entrance to the lobby and gives access to two banks of elevators, three on each side. The clerks' office, cashier's desk, parcel checkroom, and similar offices are located in the immediate vicinity of the elevators.

Surrounding the lobby is a mezzanine floor, the front portion of which forms a long promenade overlooking the main lobby and the Italian dining room. The rear of the floor is devoted mainly to the pastry rooms and kitchen, which brings this department in close connection with the principal dining rooms.

The next floor above, the plan of which is not shown, is occupied by a large parlor near the elevators and a large state suite in the east wing. The remainder of the floor is devoted to service departments and dining rooms for the employees, together with a number of guest rooms in the west wing.

There are two typical bedroom floor arrangements, both of which are reproduced on Plate 103, one with the service pantries from which the room service is given for three floors, including the one above and below, the other without the service pantry. There are five floors of the former type and in the wings on these floors a further variation is made from the typical floor to provide larger apartments than the average hotel suite.

The seventeenth floor contains the ballroom, together with a large reception room opposite the elevators and several private dining rooms with service hall in connection. The main elevators extend to the eighteenth floor and open on to a lobby which leads to the gallery of the ballroom. The kitchen service for the banquet rooms also occupies part of this floor.

A further dining room located in the basement is known as the Elizabethan room and is served by a special kitchen conveniently disposed in relation to it. Sub-basements provide space for such apartments as wineroom, storerooms, butcher shop, bake shop, vegetable room, storage refrigeration, vacuum cleaning, filtration, and ventilation plants.

The decoration of the hotel shows careful handling in all its details and demonstrates a further advance in giving American hotels a homelike character. The lobby is a room of great richness and dignity. The walls are paneled with French walnut and the ceiling, a reproduction of one at Fontainebleau, is richly decorated in red, gold, and brown. The Italian dining room, arranged three steps above the lobby floor, is similar in its decorative treatment to the lobby. Above the walnut panels in this room there is a deep frieze decorated with mural paintings, portraying the seasons. The illumination is effected by crystal chandeliers, wall brackets, and table lamps. The Georgian dining room is carried out with great simplicity in a light gray color. The ballroom, 125 feet long and 52 feet wide, seats five hundred on the floor and three hundred in the gallery. At one end of the room there is a disappearing stage. The room is decorated in white and the walls under the gallery are decorated with mirrors. The illumination is effected by crystal chandeliers and wall brackets. The Elizabethan room and the men's lounge in the basement are carried out in the style of the old English baronial halls. The walls are paneled in light oak and the ceilings are of decorated plaster with ornamentation appropriate to the architectural style. The floors of both rooms are of large black and white tiles.

The main kitchen, located in the rear of the mezzanine floor, is afforded an abundance of natural light and ventilation in addition to ample artificial ventilation, so that it is a comfortable-working apartment. In its relation to the dining rooms it follows the arrangement successfully worked out in the Blackstone Hotel in Chicago. The walls and counters are faced with white enamel brick. The floor is tile and all ranges, steam tables, refrigerators, etc., are placed on sanitary bases. The ceiling is furred down to enclose all overhead pipes, and care has been given to have no pipes exposed in the other parts of the room. The woodwork in all parts of the service portion is of walnut. Refrigerators are built with flush doors made air tight by means of a gasket which can be taken out and renewed.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE sense of unpleasant relations and misunderstandings which have for a long time existed between the members of the United States Congress and the American Institute of Architects seems now to present a possibility of being removed. It is to be hoped that the signs that are now evident point to a mutual understanding between these bodies wherein Congress will recognize the value of the services the Institute can render in the building up of a proper architectural development of our national structures and show a willingness and wholesome desire to adopt a receptive mood for such services.

We are led to believe that such co-operation is not improbable because of the measure of success which has attended some recent work of the Institute. In a practical manner and with convincing proof it has called attention to the wasteful and extravagant policy pursued by the Government for many years in authorizing the erection of federal buildings in sections of the country where it was politically expedient to obtain them, regardless of the fact that other and more important federal building was entirely neglected. It has also been brought to the attention of Congress that the impoverished condition of the facilities of housing the Government departments in Washington is entirely needless. Officials have evidently been awakened to the tremendous waste that occurs annually for rental of privately owned buildings for Government uses, and there is now a sign of realization that the waste can be efficiently and economically remedied by the adoption of a policy that will ensure buildings to meet the purposes of the Government adequately and display that dignity so essential to the conduct of its business.

The immediate result of the effort is an amendment added by the Senate to the Sundry Civic Bill providing for a Public Building Commission to be composed of the Chairmen of Committees on Appropriations and Public Buildings of both branches of Congress, with two additional members from each committee to be appointed by the chairman, the Superintendent of the Capitol Building and Grounds, the Superintendent of Buildings and Grounds, and the Supervising Architect. The commission's work is the investigation of the public building situation in Washington; it is to complete its investigation and report to Congress by January, 1918, and is allowed $10,000 to cover the expenses involved.

This surely seems a step in the right direction and it is to be hoped that with a report setting forth the actual conditions Congress will see fit to take early and deliberate action to relieve one of the glaring inefficiencies in our national capital. With the conditions recognized, we may then hope for the adoption of a government policy that will acknowledge the value to the Government of the experienced and talented architects of the country to the end that federal buildings may be constructed to form a lasting monument to American architecture as well as provide well planned and equipped buildings for the efficient administration of government business.

The work of the commission just appointed should be followed by every architect and although its findings probably cannot be influenced one way or another by individual members of the profession, the outcome will have a strong interest for architects in general, and its report will undoubtedly have a large part in forming any future government policy in relation to federal building and the attitude of Congress toward the profession.

General recognition of the ethics governing the practice of law and medicine is now accorded the members of those professions, but it was only through their tireless efforts to formulate standards and then demand respect of them from others that has made this condition possible. The same holds true in the profession of architecture and it is hoped that the work which is now being done will lead to a fuller recognition of the ethics of the architectural profession by Congress and that harmonious and co-operative relations may be established between them.

BOOK NOTES.

GOTHIC ORNAMENTS SELECTED FROM VARIOUS ANCIENT BUILDINGS IN ENGLAND AND FRANCE. By Augustus Pugin. New and revised edition. Ill. 92 plates, 8½x11 inches. London, J. Tiranti & Co. $3.12. The work undertaken by Augustus Pugin in detailing and assembling the great variety of Medieval Gothic Ornaments in his collection is one of great value from an archæologic standpoint, and to all those interested in the study of Gothic architecture. To such this reprint will prove of great service, although in the light of modern thought in connection with the Gothic style the designer will probably prefer to make use of them as a source of inspiration rather than as exact models.

NIGHTS — IN ROME, VENICE, LONDON, AND PARIS. By Elizabeth Robins Pennell. Ill. Philadelphia, J. B. Lippincott Co. $3.00. To the architect who has traveled in Europe, or to him who entertains the hope of some day doing so,— and what architect does not? — a book which relates the fascinations of European travel has an interest. When to this promise of pleasure is added the charm of Joseph Pennell's etchings and the attraction of Mrs. Pennell's writings, a sense of delight is awakened. The present book has, however, more particularly to do with people than with travel; it brings to the reader intimate scenes that happened in these cities among persons who have contributed to the world's treasure of art and literature, not during their working hours of the day, but in their hours of relaxation at night, when their thoughts were freely exchanged and their true personalities divulged.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

AUGUST, 1916

EVOTED TO THE ART AND SCIENCE OF BVILDING

OGERS AND MANSON COMPANY PVBLISHERS

ANDREA PALLADIO

BORN IN VICENZA, 1508. DIED 1580. ARCHITECT OF PALACES BARBARANO, DEL CONSIGLIO, AND CHIERIGATI, VICENZA; AND CHURCHES SAN FRANCESCO DELLA VIGNA, SAN GIORGIO MAGGIORE, AND IL RENDENTORE, VENICE

THE BRICKBVILDER

VOLUME XXV AUGUST, 1916 NUMBER 8

Recent Domestic Architecture from the Designs of John Russell Pope.

By H. D. SMITH.

THE publication in this issue of four brick houses from the current work of Mr. John Russell Pope is interesting at this time, following so closely upon the presentation for public consideration of the new great classic Temple of the Scottish Rite in Washington and the Tudor house of Mr. Stuart Duncan at Newport. These houses for Mr. George Hewitt Myers at Washington, Mr. James Swan Frick at Guilford, Baltimore, Md., Mrs. Arthur Scott Burden at Jericho, Long Island, and Mr. Ogden L. Mills at Woodbury, Long Island, respectively, have been produced contemporaneously with the two larger commissions which have already attained such marked popularity in the profession.

It is readily apparent that similar feeling, both in conception and execution, has dominated all of these efforts. It is that peculiarly characteristic feeling which has dominated all of Mr. Pope's work, that feeling which is given by a close and intelligent study of precedent, taking the good and leaving the ill fitted, making precedent serve to a purpose and not becoming enslaved to it.

These four houses are easily classed with the residences of Mrs. S. R. Hitt and the Hon. Henry White in Washington, which preceded them by a few years. They recall the notes of that English style of the Adam Period, and are carried out in detail likewise influenced by the refinement found in the best of Italian Renaissance.

Requirements and conditions for large private residences to-day are so many and so varied, so delicate and so complicated, that the use of precedent must be carefully and painstakingly guarded in order that the real uses and conveniences of buildings are not subserved to general scheme and appearances.

View from the Garden
House of George Hewitt Myers, Esq., Washington, D. C.

Fault was found with the buildings of the very period of English work which have given the inspiration and which have more or less influenced the design of these four houses. The architects of that period were enamoured of the Roman and Renaissance precedents, their symmetry and grandeur, to the exclusion of comfort and convenience.

One of their contemporary poets remarks:

> "'Tis very fine,
> But where d'ye sleep, or where d'ye dine?
> I find by all you have been telling
> That 'tis a house, but not a dwelling."

and Lord Chesterfield is said to have remarked that General Wade would better have taken a lodging opposite his Palladian mansion if he liked nothing save its front.

The charm, the character, and the interest in these four houses would avail but little if their owners felt constrained to live opposite in order to enjoy the beauties of their façades.

In these houses the architect has absorbed himself in creating architecture which is at once dignified and capable of forming a convenient and comfortable background for the persons who are to make them their dwelling places. And as dwelling places they have been developed through a period of study which did not end

with the completion of a set of drawings, but which continued through the working period of construction and is not even ended when the owners are carefully housed within them, but continues, studying with them the minutest details which make for distinctive habitations.

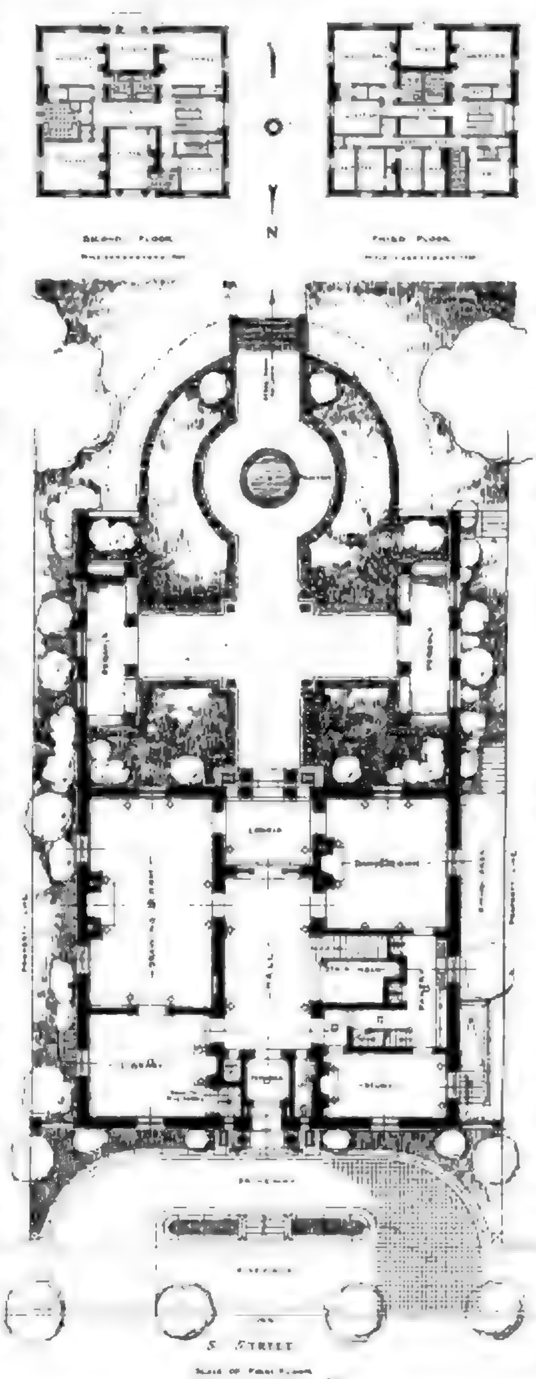
To this end the study of his clients' characteristics, needs, and conditions are Mr. Pope's first consideration, and his attitude has been one of helpfulness in creating an atmosphere of simple domesticity without sacrificing largeness of scale or the charm of dignity. This has the natural result of creating houses which are lasting in their quality of charm, and not of the faddist styles which might attract us to-day, but which are despised or forgotten to-morrow. They are houses which wear well, houses which time and age improve, and in which atmosphere continues to grow with no fear of becoming monotonous.

THE HOUSE FOR MR. GEORGE HEWITT MYERS.

The house for Mr. George Hewitt Myers in Washington, with its Palladian motive, shows more Italian influence than any of the other three. Externally, the charm is due not only to grace of proportion of void and solid, but also to delicacy of profiles, projection, and carving. The double story Palladian motive on the garden façade is most successful in that it furnishes a very pleasant loggia on the first floor and gives on the main bedroom floor a spacious sleeping porch, a very happy solution of a problem which has whitened so many temples and furrowed so many brows.

It well befits a private house in the city not to invite the passerby with its openness. The entrance is just on S street, but the street is shut out directly upon entering the hall by solid doors. The vista is immediately open, however, out through the loggia and into the south garden, where are the pergolas, the gravel paths, the fountain, the terraces, and the lawn.

As in all of these houses, the hall has a solidity and permanence given by marble floors. The plan is very direct. The stairs lead directly off to the west and are of fine Colonial detail, studied to be free from any disturbing curve of line. The halls are of wood paneling painted old ivory white.



Plans of House and Garden
House of George Hewitt Myers, Esq., Washington, D. C.

The drawing room and library, the latter hardly more than a book lined alcove off the former, are done in simple veined Italian walnut. The dining room is in oak with a delightfully carved chimney piece in limestone. The study is in natural cedar, in the panels of which are hung part of a large and interesting collection of Chinese prints.

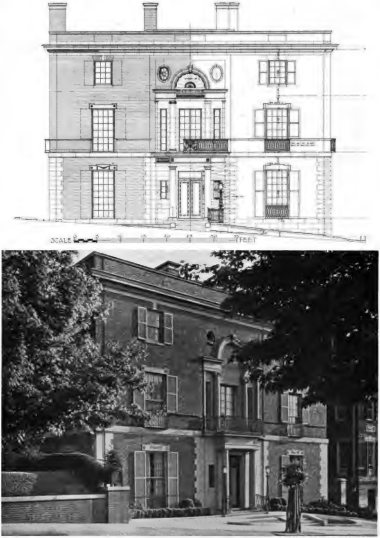
A great deal of atmosphere is given to the house by the collection of Oriental rugs with which Mr. Myers has surrounded himself.

The outside service for Mr. Myers' house is accommodated in a building on the rear of the property facing Decatur street near Massachusetts avenue, which is on a much lower level than the south garden. This allows the terrace to extend over the roof, and those accessory parts of heating plant, garage, and storehouse are not in view from the house and its pleasant little garden.

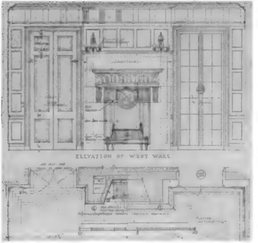
HOUSE FOR MR. JAMES SWAN FRICK.

Freed from the restrictions of the city lot, the house for Mr. James Swan Frick at Guilford, Baltimore, stands in a grovelike plot at the head of one of the pleasant avenues of Roland Park. The south façade bends intimately into the grove with a quiet dignity and strength which one finds in the old southern Colonial mansions. The north façade with its recessed entrance and tall, slender columns is strongly reminiscent of that old Polk mansion which has been so much admired for its queer, quaint *naiveté*, but whose proportions are seldom met with in modern work.

The doorways are both big in scale and refined in detail, but are subordinated as details of a scheme which depends so entirely upon the careful study of proportion of mass and outline, of void and solid, of light and shadow, as to make ornamentation superfluous. The subtlety of pilaster and brick projection, the sharpness and squareness of the cornice, its projection and depth, and the



ELEVATION AND VIEW OF STREET FRONT
HOUSE OF GEORGE HEWITT MYERS, ESQ., WASHINGTON, D. C.
JOHN RUSSELL POPE, ARCHITECT



Detail of Fireplace Side of Dining Room
House of George Hewitt Myers, Esq., Washington, D. C.

height of the upper parapets are accurately proportioned to the height of the building and to its length.

The materials used are brick and painted wood trim. Second quality bricks were insisted upon to insure a certain unevenness of texture which must be obtained to overcome the painfully careful workmanship of the conscientious mechanic. The wood is of cypress, a wood which will withstand the friendly assaults of the weather even when mellowed by being deprived of some of the protection of the first coats of even and glaring white lead paint.

The twin roads of Charlcote Place allow access on either side of the north front. The gravel forecourt lies square in front of the house, walled at the back with the garage, plain and of most pleasing proportions, with just a playful note of lattice marking the small pool opposite the entrance door of the house.

The entrance and stair halls are very architectural and precise in treatment. The detail is very much in the queer character of the Greek Revival, such as marked an interesting period of our Colonial work. The color is a warm gray, toned and glazed to an old stone finish. What ornamental detail there is in the cornice above the damask covered walls of the drawing room and in the library, done in walnut with touches of old gilt, even tastes of the period of the Empire — an influence also felt in a certain period of our Colonial design.

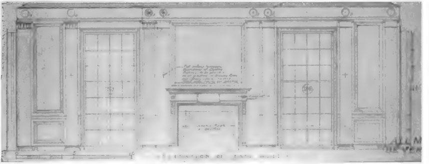
The mantels of the three large rooms, as well as those in the reception room and Mr. Frick's office, have the sentimental value of having been taken from Mr. Frick's former Colonial mansion in Baltimore, which he gave up to take this homestead which breathes the atmosphere of a century ago, but which is so beautifully adapted to his needs of to-day and to-morrow.

COUNTRY HOUSE OF MRS. ARTHUR SCOTT BURDEN.

Michael Angelo's philosophy about his sculpture was that every piece of marble with which he worked had something good created in it, and that his task consisted in merely chipping and chiseling away the unnecessary bulk of material and exposing the beautiful or powerful something which the block contained.

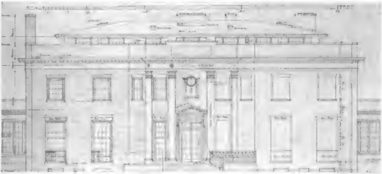
To any one who had seen the wooded thicket on the high part of the seventy-acre plot of Mrs. Arthur Scott Burden in the midst of the Jericho colony on Long Island, the existing creation of house, gardens, loggias, service buildings, roads, courts, lawns, and paths would suggest the old idea of the master sculptor.

There in the edge of the woods, spreading out comfortably over the ground surrounded by its flowers and shrubs and vines and old trees, and approached by its simple



Detail of Fireplace Side of Drawing Room
House of George Hewitt Myers, Esq., Washington, D. C.

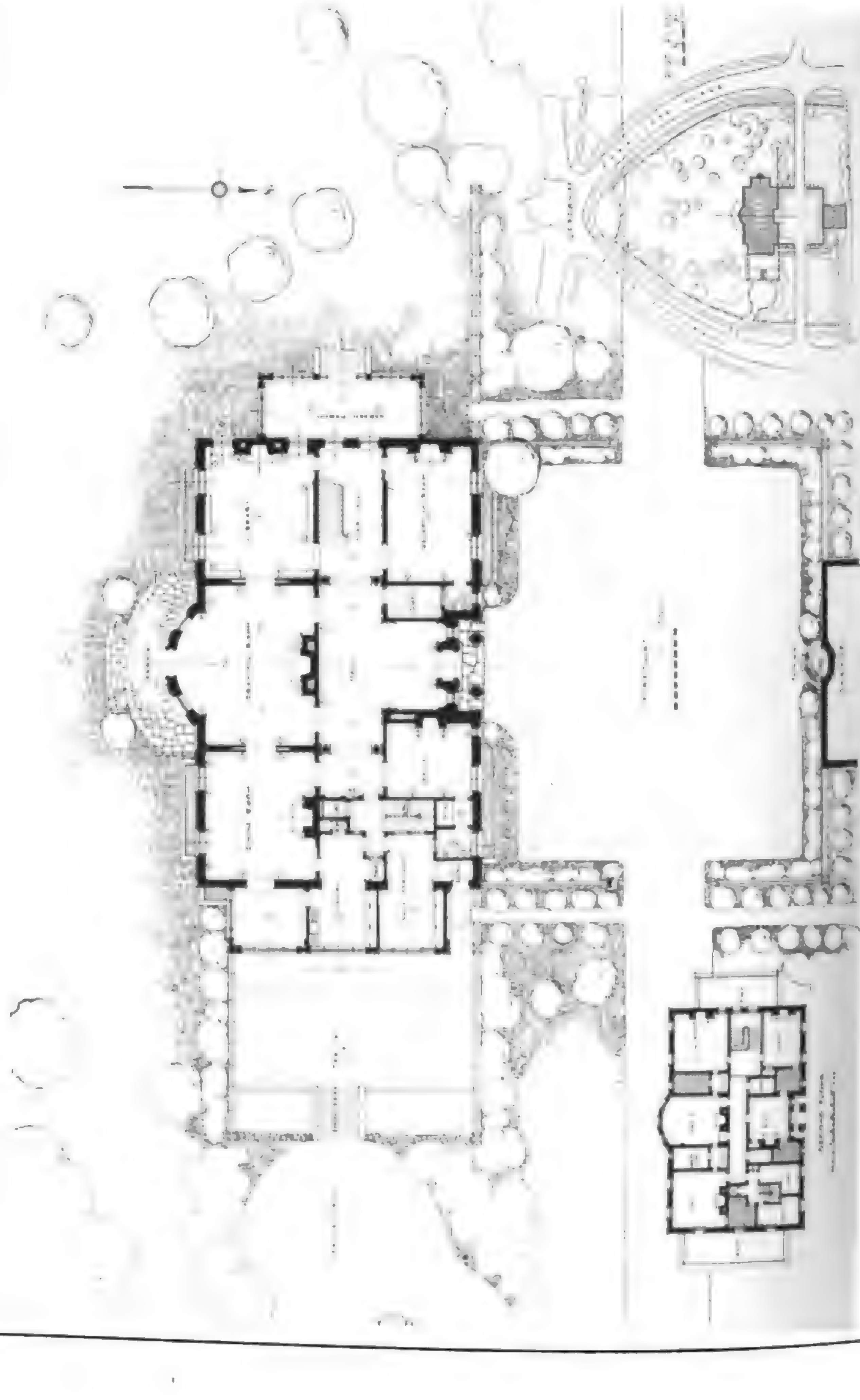
VIEW OF SOUTH FRONT



ELEVATION OF SOUTH FRONT

HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.

JOHN RUSSELL POPE, ARCHITECT



HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.
JOHN RUSSELL POPE, ARCHITECT

winding roadway through the woods at the back, seems always to have been this old English manor house. It has all the marks of privacy and intimacy which one dreams of as making a home in the country, away from all that he wants to be away from, and surrounded with all he wishes to be surrounded with.

These marks of privacy and intimacy are not fanciful, but are real and distinguishable. The satisfying graciousness of the front door, with its touch of wrought iron softened by the masses of Dorothy Perkins roses; the complete frankness of the large windows which show the floor level but inches above the grass; the slenderness of the decorated pilasters which rise from the grass and out of the planting to embrace the windows of the chamber floor — these are marks of intimacy. The winding of the road through the old apple orchard and the woods of oak, locust, elm, and dogwood; the high garden walls of brick over which the tops of porches appear; the long walls of stone with the suggestions of formal planting appearing above — these are marks of privacy.

In line and mass Mrs. Burden's house is very different from that of Mr. Frick at Baltimore, but the details are of very similar nature, and the underlying principle of utmost simplicity has governed both creations. Both have the graceful, floral capped pilaster order, which, being purely decorative in motive, depends entirely upon its proportion for its *raison d'etre*. Both have the square, sharp-looking cornice with flat, mutule-like modillions, and both have the studied parapet in the brick above.

Simplicity is not only a feature of exterior design, but it is also an essential feature of the plan. The north side of the plan is given over to the marble floored entrance and stair halls, a small reception room, and a schoolroom. The other rooms to the south and west, particularly the long living room, are assured of complete privacy and almost seclusion. The service portion is drawn out commodiously, extending to the men servants' pavilion on the extreme east, the niched ends of which balance the loggias of the garden at the west, some two hundred feet away.

The entrance and stair halls are painted hard plaster with detail as of stone, in the fashion of the halls of the fine old London houses of the Adam days; the walls a rich, thick, cool gray, with slate-colored pilasters and columns marking the openings.

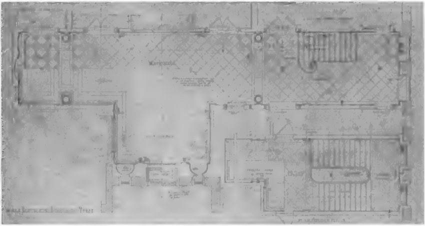
The feature of the plan is the elliptical stair hall, domed at the second story ceiling, with the beautifully executed stair railing of charming thin proportions, touched with tarnished gilt. The merging of the entrance hall into the stair hall by recalling the ellipse on the hall side is particularly happy.

The dining room is given an air of spaciousness by the judicious choice of furniture, ample in size but not large. The room is green, a dark rich olive green, glazed unevenly with soft grays and browns so that it is pervaded with an atmosphere of restfulness. The square little inviting library is all of natural teak. The juxtaposition of books and doors, symmetrically disposed on each wall, under similar elliptical arch motives is interesting.

The large room of the plan, the living room on the

View of Garage and Forecourt
House of James Swan Frick, Esq., Guilford, Baltimore, Md.

VIEW IN HALL, LOOKING TOWARD ENTRANCE



DETAIL PLAN OF FIRST FLOOR HALL AND STAIRWAY

HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.

JOHN RUSSELL POPE, ARCHITECT

southwest corner, is a most successful adaptation of a plain old Georgian room, whose boldly simple mouldings and panels form an adequate background for the rare furniture of the William and Mary period and needlework pieces in which Mrs. Burden is so much interested. The warm mellowness of the yellow walls, aged by wear and many coats of paint and rubbing, lends an atmosphere of color and tone which is hardly appreciated from the illustrations.

The dining room, library, and living room open on the south through all their windows to the open lawn, the living room also opens to the west on to the thin ironwork porch which virtually lives as a part of the little flower garden which is flanked by the two white columned loggias.

Forecourt and Entrance Front
House of Mrs. Arthur Scott Burden, Jericho, Long Island, N. Y.

On lower levels and reached by old fashioned worn flag steps and paths are the rose garden and the pool garden, the planning, planting, and care of which are of such particular personal interest to Mrs. Burden.

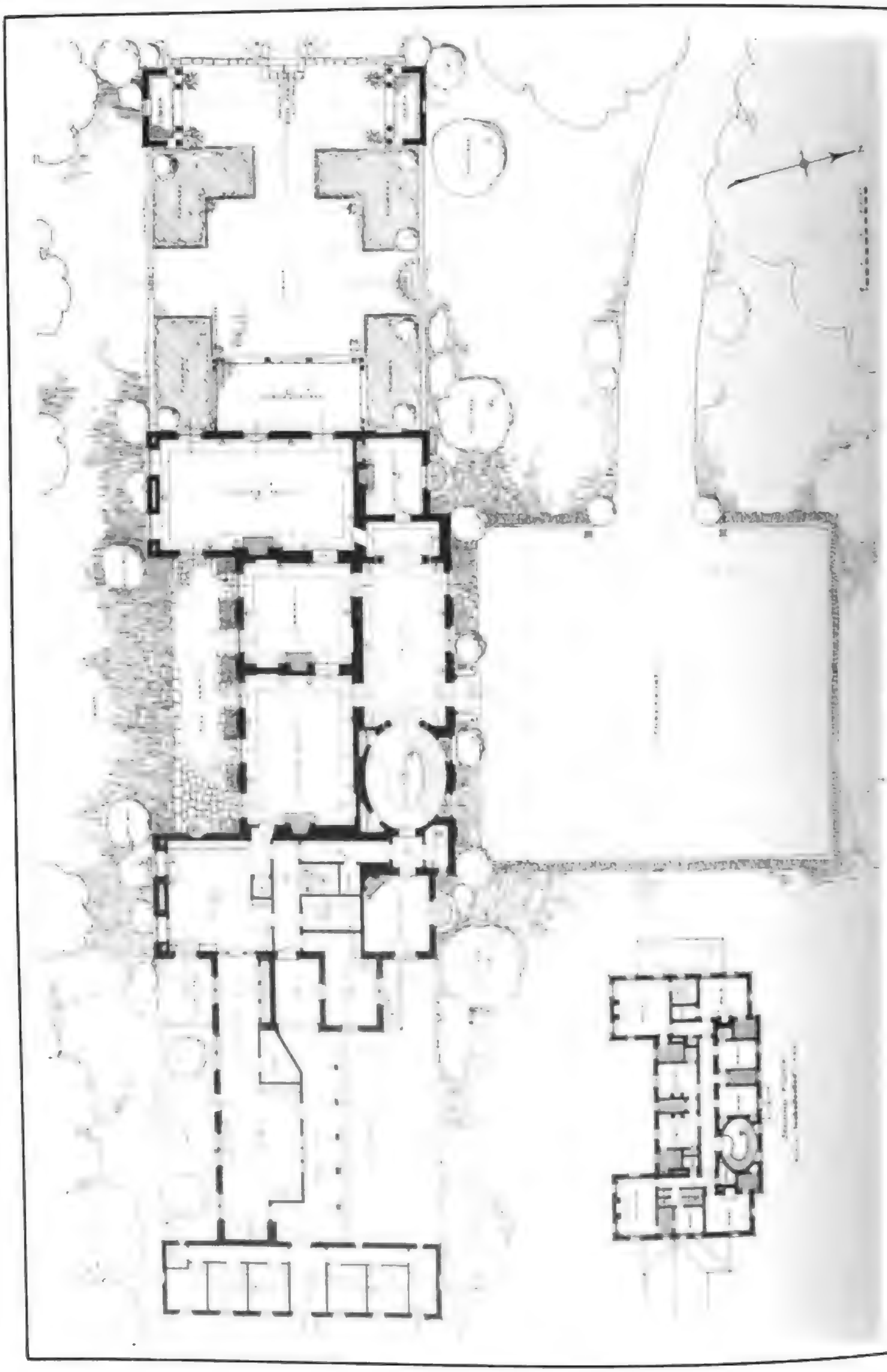
The *ensemble* is altogether lovely, simple, and lasting, and grows in charm and sentiment as it continues to age and be lived in.

THE ESTATE OF MR. OGDEN L. MILLS.

On the estate of Mr. Ogden L. Mills at Woodbury, which lies over toward the north shore of Long Island, Mr. Pope has taken every advantage of contour and natural growth in the placing of an almost monumental country seat. He has spread his architecture over a plateau with views in all directions, and by most ingenious planning he has embraced courts, porticoes, and loggias by wings and walls so that every portion of the house is flooded with light and the good free air of the countryside. He has done this without any appearance of rambling, looseness in mass, or of disconnectedness in plan.

The natural beauties of the site have been supple-

Living Room in House of Mrs. Arthur Scott Burden, Jericho, Long Island, N. Y.



HOUSE OF MRS. ARTHUR SCOTT BURDEN, JERICHO, LONG ISLAND, N. Y.

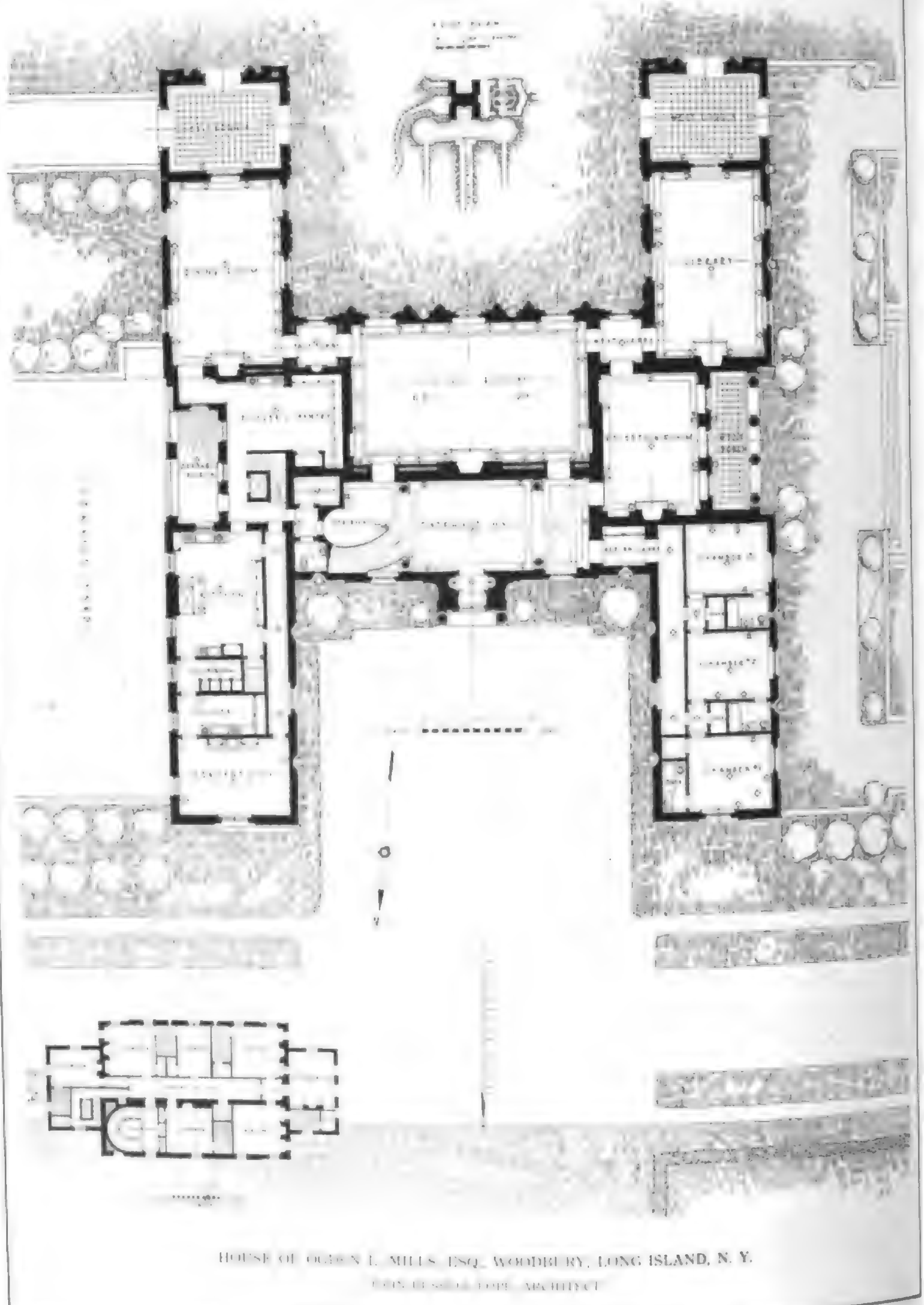
JOHN RUSSELL POPE, ARCHITECT

ENTRANCE HALL LOOKING FROM STAIR HALL

DETAIL OF CORNER OF LIBRARY

HOUSE OF MRS. ARTHUR SCOTT BURDEN, JERICHO, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT



HOUSE OF OGDEN L. MILLS, ESQ., WOODBURY, LONG ISLAND, N. Y.
JOHN RUSSELL POPE, ARCHITECT

mented by the making of gardens, and particularly by the open lawned alley of cedars extending north from the house and forecourt, opening the vista to the lake in the lowlands and to the hills of woods beyond. This alley has been made by the transplanting of cedars which were native on the estate. The two large circles in the entrance drive northeast and northwest of the building are also fashioned from these cedars.

Detail of Vase
House of Ogden L. Mills, Esq.

In the building up of its mass this house is probably unique among country houses. The central portion rises through two stories, with its cornice and parapet of somewhat Italian feeling, and is flanked and carefully held in by the well proportioned blocklike wings whose flat fretted cornices carry the line of the first story order around the entire building.

The order is inspired by that used on the Orangerie at Bowood, Wilts. It is used sparingly about the entrance court, but is fairly lavished on the lawn court to the south in the form of columns and pilasters, singly and in pairs. Niches, with urns very Adam-like in conception and execution, with carefully placed plaques of low relief in the same character, are the elements used to supplement the order and the window disposition in making up the composition of the building.

"Cedar Alley" Looking Toward House
House of Ogden L. Mills, Esq., Woodbury, Long Island, N. Y.

The scheme of entrance and vertical circulation is not unlike that in Mrs. Burden's residence. Through the entrance door made pleasing by the vigorous carving of the surrounding stonework, the hall is entered on the center axis. On the left, and marked by columns as at Mrs. Burden's, is the stair hall extending through two stories. To the right is the entrance to the reception room and the lobby to the guest room wing, which contains three large chambers, each provided with a bath.

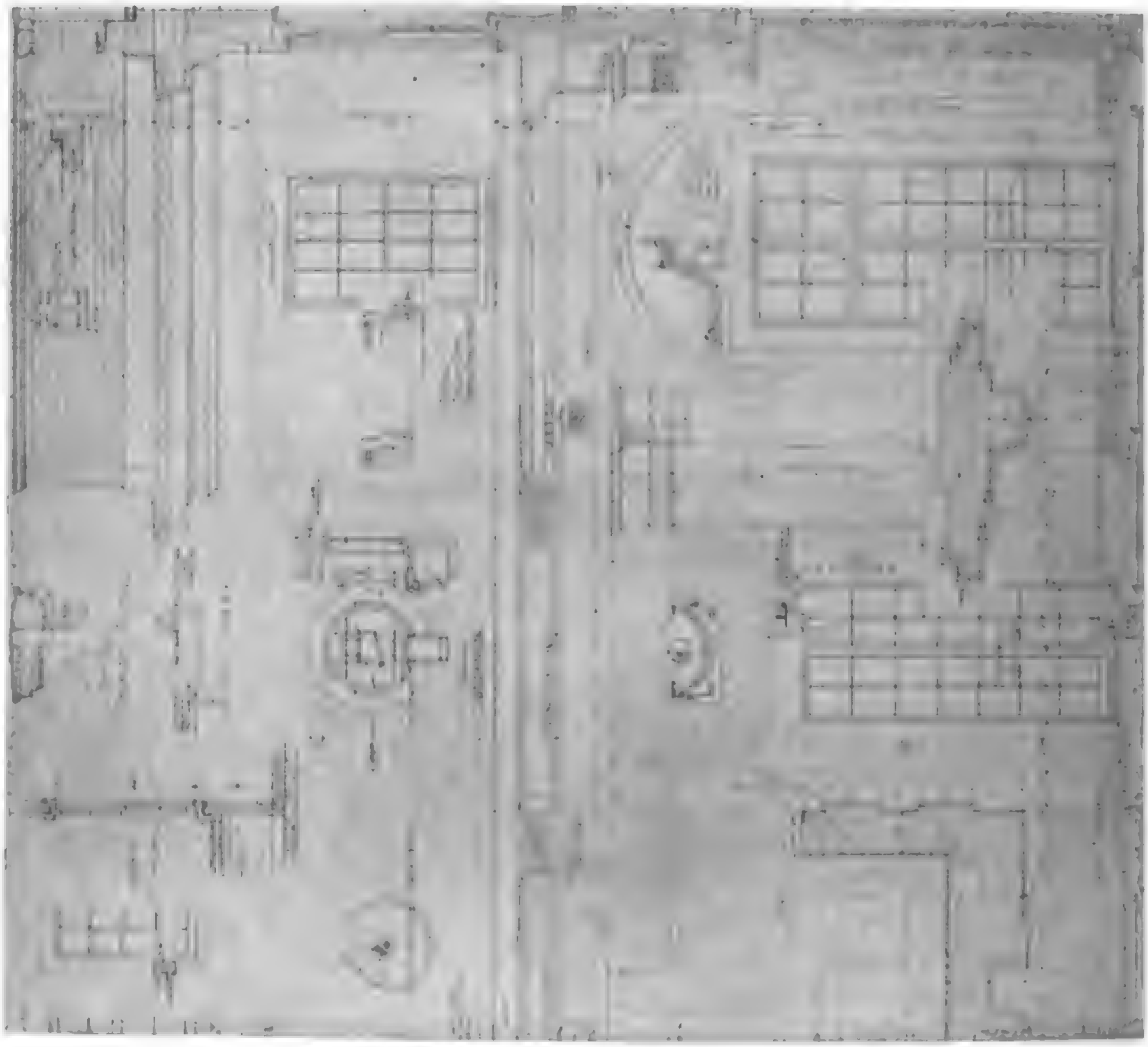
The large room of the plan, 28 by 56 feet, extends across the entire south side of the main part of the house and opens out directly upon the court lawn. At the south corners of this room are the little square, interesting lobbies which are small enough to help give the idea of real scale to the rooms they connect. The one to the southwest leads to the library wing, and that to the southeast leads to the dining room wing.

These two rooms, which occupy each an entire wing, open on the inside to the court lawn, and the library opens on the west to the formal flower garden which axes on the reception room and its loggia. These two wing rooms open on to their arched loggias, which form interesting terminal features to both wings.

The service requirements are accommodated in the northeast wing which balances the guest room wing on the opposite side of the entrance court axis.

To the west of the house, on the main long axis directly off the reception room, is the formal flower garden with its pool, its grass steps, and box fringed grass paths. Mr. Pope has given this garden just enough of the touch of architecture in the steps, and the brick and stone balustrades, to make it one with the monumental character of the house, and to help hold in proper restraint the exuberance of the floral growths.

The monumental strength and solidity of the entire structure is made intimate by the openness of the large casements and is softened by the masses of vines which the sturdiness of the brick and stone walls seems to invite to grow upon them. It is a house which is large enough and important enough for its magnificent setting, and which is small enough and intimate enough and lovely enough for its owner to use and enjoy as a summer country seat.



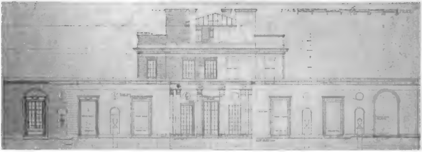
DETAILS OF SOUTH OR GARDEN FRONT
HOUSE OF OGDEN L. MILLS, ESQ., WOODBURY, LONG ISLAND, N. Y.
JOHN RUSSELL POPE, ARCHITECT

DETAIL OF LOGGIAS ON SOUTH FRONT

INTERIOR OF LOGGIA AND VIEW ACROSS TERRACE

HOUSE OF OGDEN L. MILLS, ESQ., WOODBURY, LONG ISLAND, N. Y.

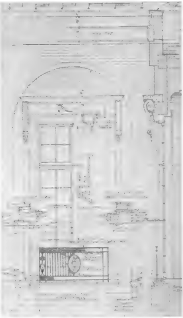
JOHN RUSSELL POPE, ARCHITECT



West Elevation, House of Ogden L. Mills, Esq., Woodbury, Long Island, N. Y.

These four houses, designed for purposes which are manifestly very different and for conditions which represent a wide range of domestic requirements, are singularly uniform in character and decidedly individual in conception and execution. They stand as a credit to their owners. They do not depend upon lavish expenditure of money, nor on the elaborate use of precious materials to command consideration. They represent a maximum of comfort, convenience, and beauty of mass, of line, and of detail with efficiency of execution and a reasonable minimum of cost. As such they surely add to the sum-total of good residence architecture of America.

View of Reception Room Porch on West Side



Detail of Windows on West Elevation

House of Ogden L. Mills, Esq., Woodbury, Long Island, N. Y.

VIEW OF WEST LOGGIA AND SOUTH COURT

VIEW OF WEST PORCH AND LIBRARY WING

VIEW ALONG TERRACE SHOWING LOGGIAS

HOUSE OF OGDEN L. MILLS, ESQ., WOODBURY, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT

VIEW OF ENTRANCE FRONT

HOUSE OF MRS. ARTHUR SCOTT BURDEN, JERICHO, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT

VIEW OF GARDEN FRONT FROM THE EAST

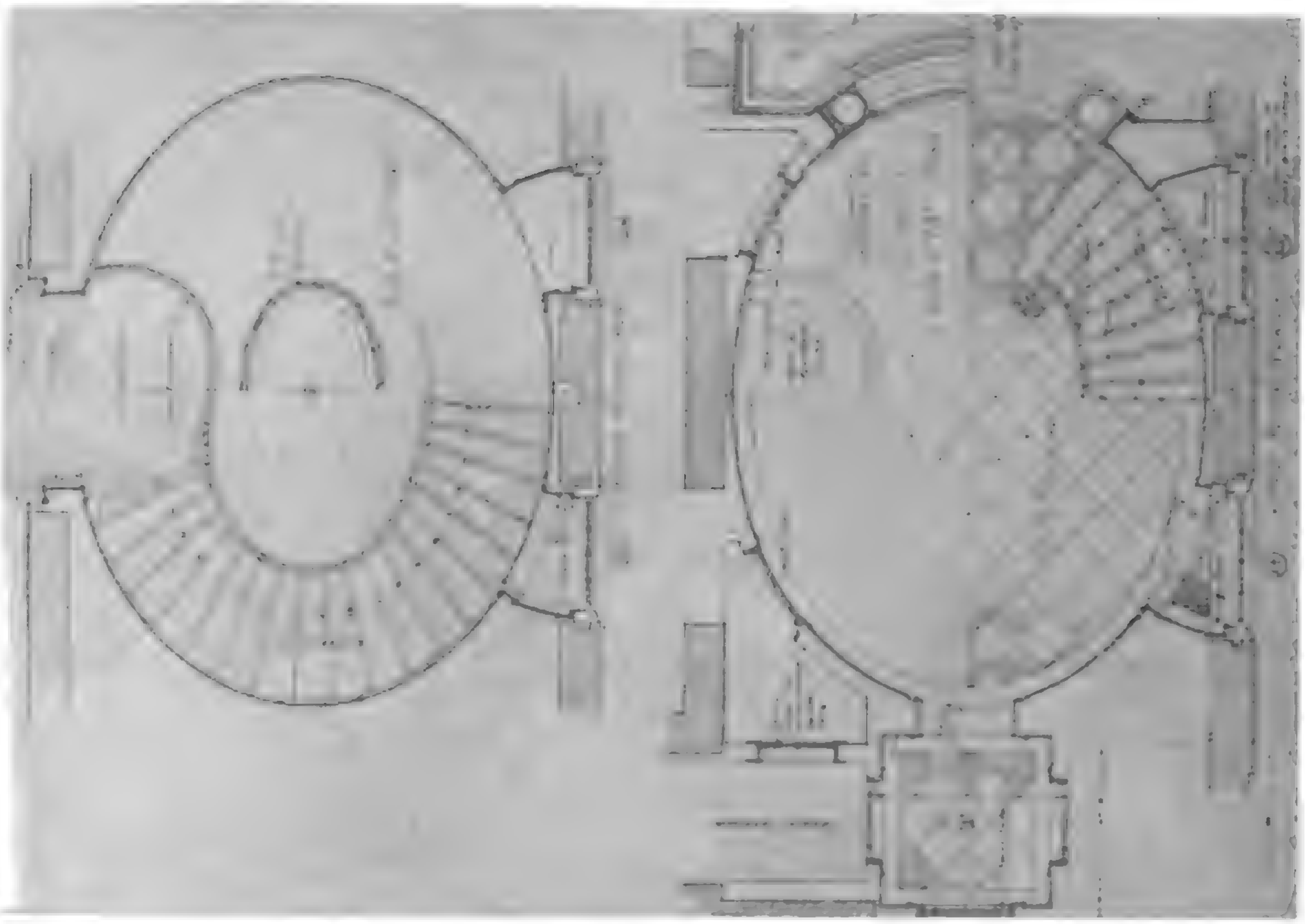
VIEW OF GARDEN FRONT FROM THE WEST

HOUSE OF MRS. ARTHUR SCOTT BURDEN, JERICHO, LONG ISLAND, N. Y.
JOHN RUSSELL POPE, ARCHITECT

STEPS TO THE ROSE GARDEN AND LOGGIA

HOUSE OF MRS. ARTHUR SCOTT BURDEN, JERICHO, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT



PLANS OF FIRST AND SECOND FLOOR STAIR HALLS

VIEW IN HALL LOOKING TOWARD STAIRCASE

HOUSE OF MRS. ARTHUR SCOTT BURDEN, JERICHO, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT

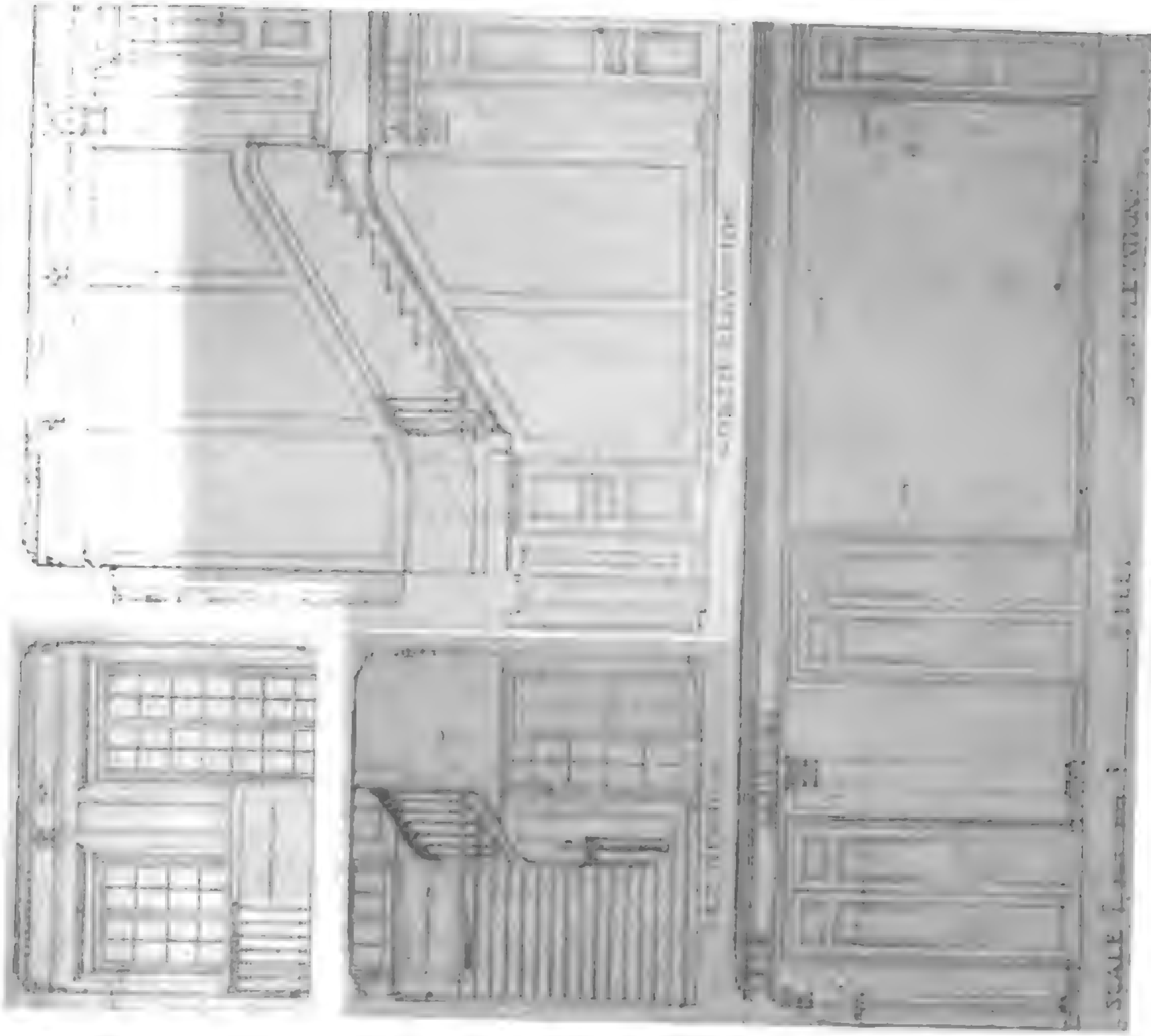
VIEW OF ENTRANCE FRONT

HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.

JOHN RUSSELL POPE, ARCHITECT

VIEW OF HALL LOOKING TOWARD STAIRWAY

HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.
JOHN RUSSELL POPE, ARCHITECT



ELEVATIONS OF HALL AND STAIRS

DETAIL OF HALL LOOKING TOWARD STAIRWAY

HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.

JOHN RUSSELL POPE, ARCHITECT

DETAIL OF BOOKCASES IN THE LIBRARY

DETAIL OF MANTEL IN THE LIBRARY

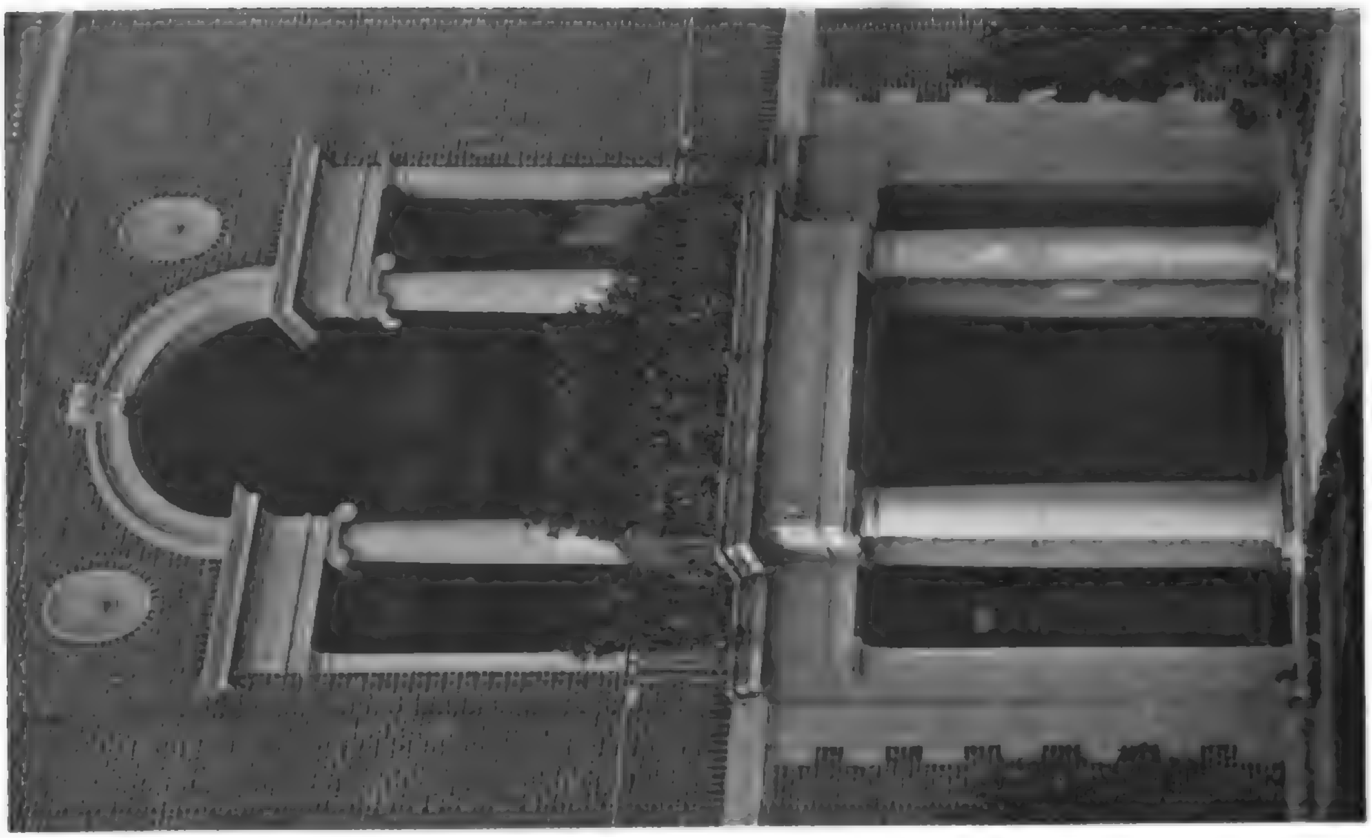
HOUSE OF JAMES SWAN FRICK, ESQ., GUILFORD, BALTIMORE, MD.

JOHN RUSSELL POPE, ARCHITECT

VIEW OF GARDEN FRONT

HOUSE OF GEORGE HEWITT MYERS, ESQ., WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT

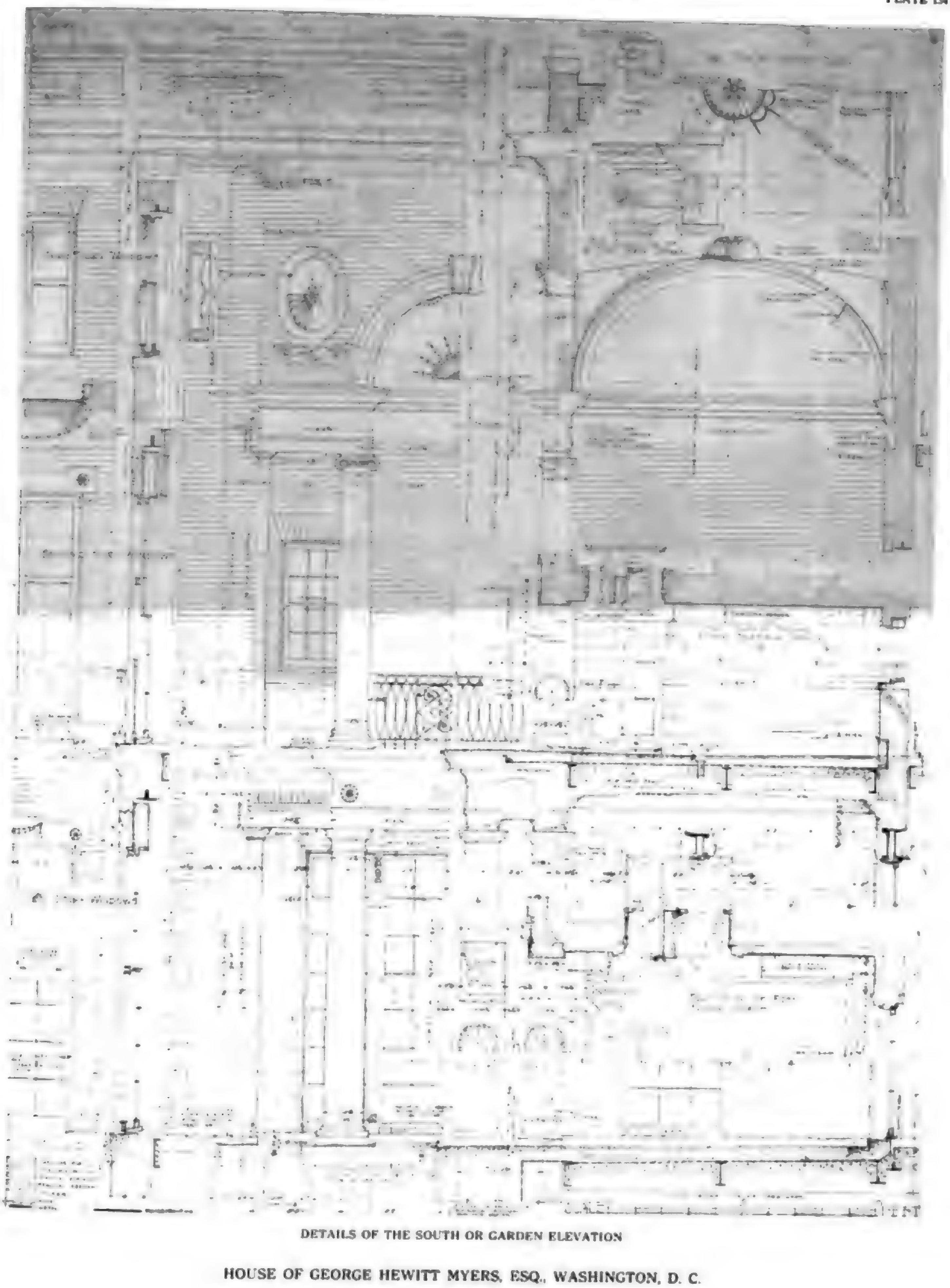


LOGGIA ON GARDEN FRONT

DETAIL OF FIRST STORY LOGGIA

HOUSE OF GEORGE HEWITT MYERS, ESQ., WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT



DETAILS OF THE SOUTH OR GARDEN ELEVATION

HOUSE OF GEORGE HEWITT MYERS, ESQ., WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT

VIEW OF EAST WALL OF HALL

VIEW OF HALL AND STAIRWAY

HOUSE OF GEORGE HEWITT MYERS, ESQ., WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT

VIEW OF DRAWING ROOM FROM LIBRARY

DETAIL OF MANTEL IN DRAWING ROOM

HOUSE OF GEORGE HEWITT MYERS, ESQ., WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS.

PLATE TWENTY-SEVEN.

SOMEWHAT similar in plan to Mount Vernon and Woodlawn, the Colross Mansion is flanked by two wings, one for the service portion and the other for the carriage shed. It was built in 1799 by Jonathan Swift and is a good example of the country house type of Maryland and Virginia Colonial architecture.

The façade shows a large scaled treatment with good proportions and fenestration. The walls are of brick laid in Flemish bond with a well proportioned width of mortar joint. All the windows have characteristic Colonial lintels. The entrance porch is spacious and shows in its design a trace of the Greek influence. The doorway is carefully detailed and the leaded fan-light has a segmental arched top rather than the usual elliptical form.

The roof is of gray slate and is embellished by three dormers of excellent proportions and a balustraded deck. Dormers of such good proportion and appropriate setting as those still existing in Alexandria are seldom found in other localities and the ones on this house are typical of the best. The ingenious manner in which the same moulding contours were used at different scales and proportions throughout the façade is interesting. The main cornice is a most effective piece of detail, composed as it is of mouldings decorated with fine ornament and having a charming profile, all in splendid accord with the porch and dormer cornices. The frieze in the latter has been subordinated to the architrave which is supported by delicately fluted Doric pilasters.

THE COLROSS MANSION, ORONOCO STREET, ALEXANDRIA, VA.

Built in 1799.

MEASURED DRAWINGS ON FOLLOWING PAGES.

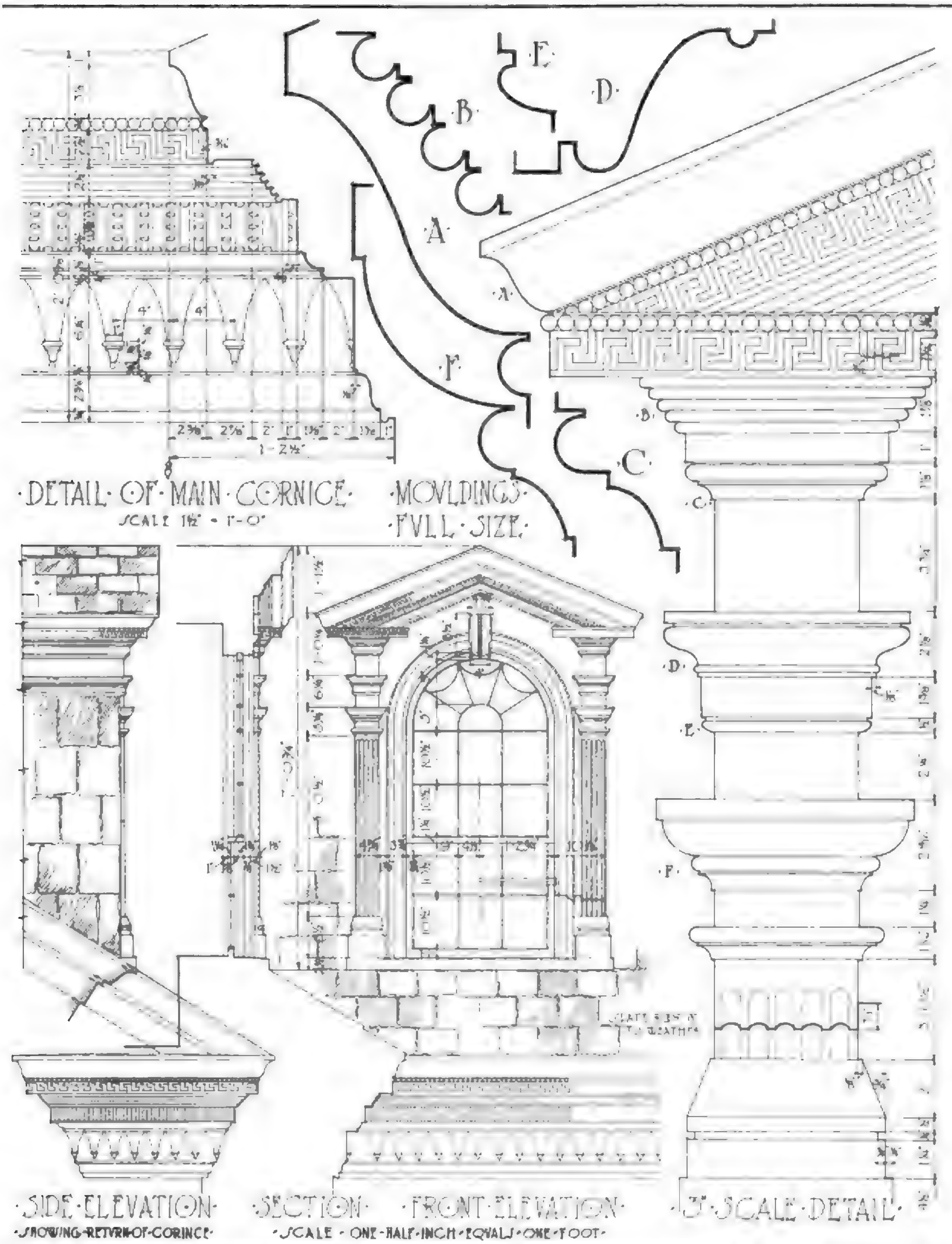


PLATE 27 AUGUST 1916	·DORMER·&·CORNICE ~ COLROSS·MANSION· ·ALEXANDRIA·VA· ·DATE·1799· ·BVILT·BY·JONATHAN·SWIFT·	·MEASVRED·&·DRAWN·BY· ·J·L·KELSTER·O·J· ·MVNSON·&·J·A·WEBER·

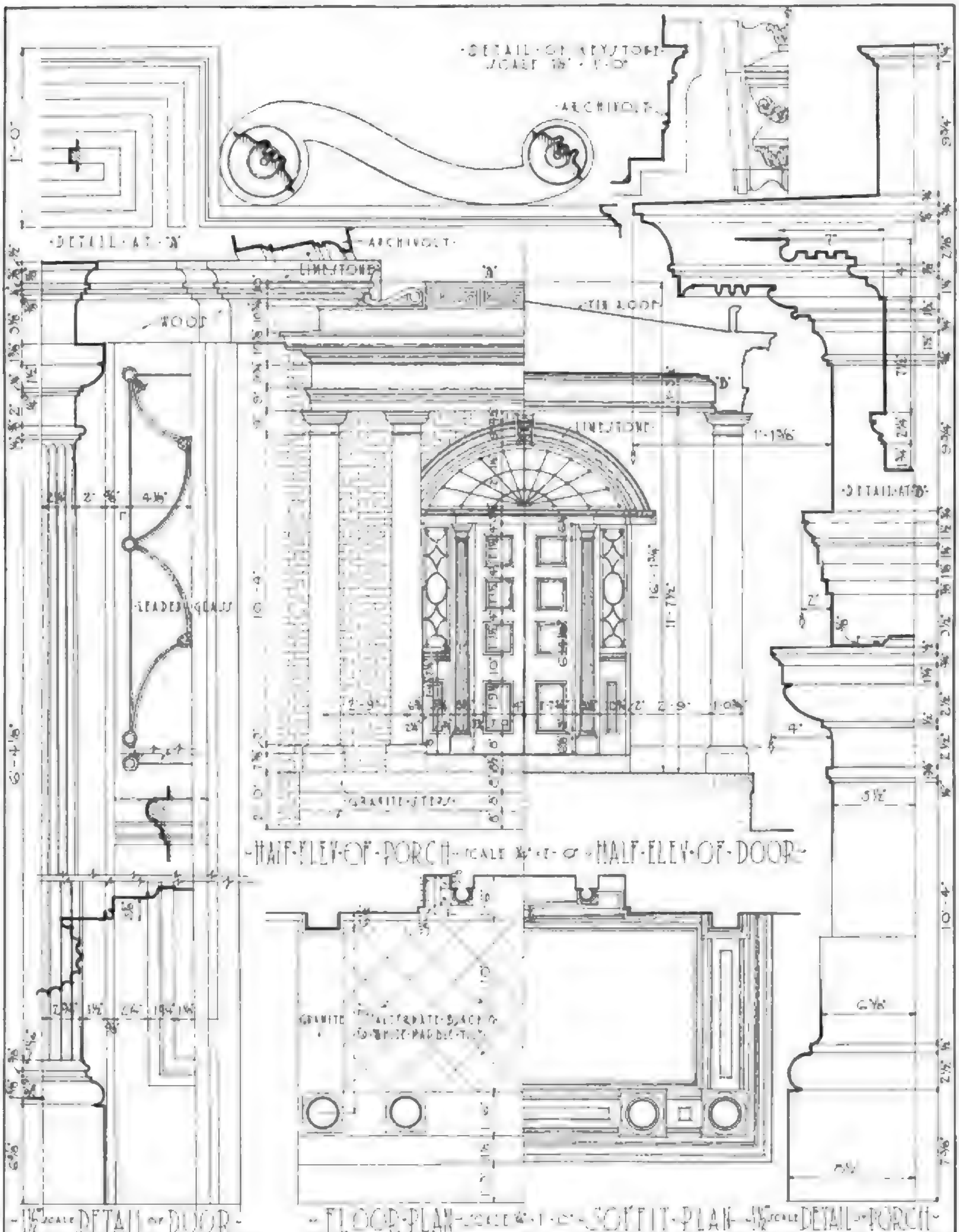


PLATE 28	DOORWAY & PORCH ~ COLROSS MANSION	MEASURED & DRAWN BY
	ALEXANDRIA VA	J. L. KEISTER ~ O. J.
AVGVST 1916	DATE 1799 — BUILT BY JONATHAN SWIFT	MUNSON & J. A. WEDER

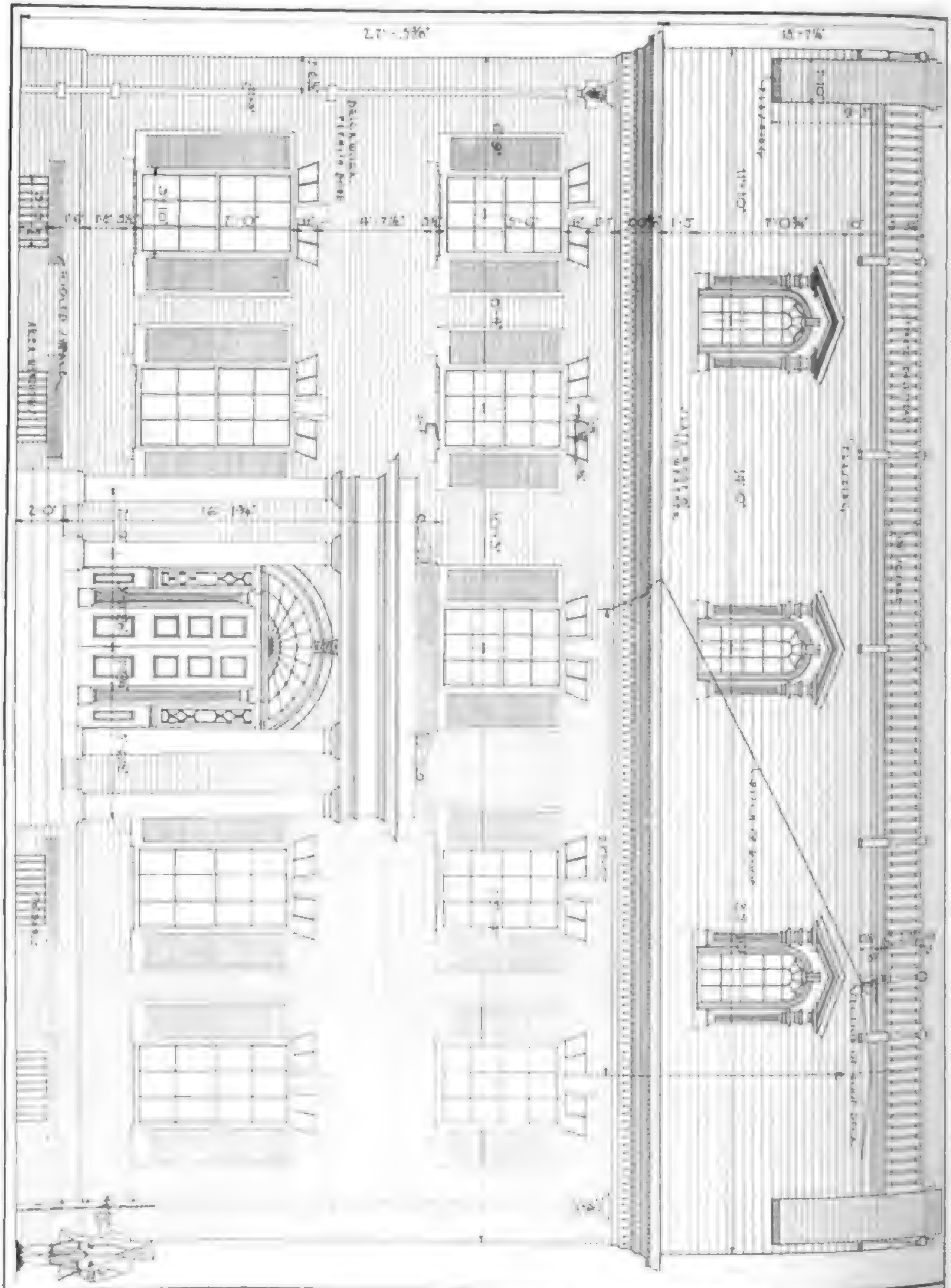


PLATE 29 AUGUST 1916	·FRONT·ELEVATION~COLROSS·MANSION· ·ALEXANDRIA·VA· ·DATE·1799· ·BVILT·BY·JONATHAN·SWIFT·	·MEASVRED·&·DRAWN· ·J·L·KEISTER·OS ·MVNSON·&·VAVENE·

Dome of S. Maria del Fiore, Florence.

A STUDY OF ITS STRUCTURAL SYSTEM.

By RICHARD FRANZ BACH.

Curator, School of Architecture, Columbia University.

IN considering a work of great structural initiative, standing on the threshold of an epoch in art, such as Brunelleschi's dome in Florence, we are confronted with two insistent questions, each leading to an inviting avenue of study: what are its historical precedents? and what is the type of construction involved? In the case of the present example we can answer both by recording briefly the structural history of the dome, referring to precedents in parallel and relying upon available contemporary accounts for explanation, as the structure rises to completion course on course.

Dome of S. Maria del Fiore, Florence

Exterior showing tribunes and other buttressing masses; also unfinished gallery by d'Agnolo at base of dome

The story of this dome is written in a number of slowly moving and loosely woven chapters, each headed by a master's name. These it does not behoove us to recount within the narrow compass of these pages.* Suffice it to say that when the work of one of these masters, Lapo Ghini, threatened to fall in 1367, his design was revised by a committee of eight artists, including Orcagna and Taddeo Gaddi. In a time of recognized versatility we are not surprised to find painters on such a board of investigation. The result of their deliberations was a model, supposedly obviating all defects thus far discovered. This showed a nave of four square bays flanked by narrow aisles with shallow oblong bays of corresponding length. The measurement from pier to pier was to be 60 feet, and the nave height 135 feet — a good indication of the Italian liking for breadth and squareness. The total interior length of the model was about 480 feet, and the octagon proper at the crossing achieved a diameter of slightly under 140 feet, while the total width of what might be called the crossing, that is, the space between the lateral apses, approximated 300 feet.

The system of support adopted for the dome, which may be considered our authoritative guide until the advent of Brunelleschi himself, recognizes the value of the original scheme of Arnolfo di Cambio, the first designer and sterling master of the thirteenth century, dated 1296, and providing for eight surfaces or severeys — no details as yet appearing, however, as to the essential structural system of the dome proper — resting upon four gigantic piers bound together by four great cross arches. One of these arches leads to the nave, and passages are built into the two piers which it spans to permit a continuous line of sight along the aisles into the open crossing. The other three arches open into polygonal, sc. four-sided, apses or tribunes, which by their covering half-domes furnish powerful abutment. These and other features to be mentioned, with the exception of the dome itself, were executed according to this model of the committee of eight, and this description of the model is to that extent, therefore, practically that of the completed building. The piers receive the direct vertical load of the dome, but must also be counted upon to resist the thrust of the great arches as aggravated by their own effort in the actual support of the dome, which effort they in turn convert into thrust. Therefore the piers are necessarily of enormous perimeter and solidity, and other masonry features are of corresponding mass. Five chapels are built into the thickness of the walls of each great apse and a sacristy into each of the eastern piers. To be doubly assured of safety the piers are further strengthened diagonally, with reference to the square formed by their bases in plan, by means of four smaller polygonal projections of masonry, whose crowns rise to the height of the apses, *i.e.*, to the upper line of the nave clerestory. It should also be noted that the exterior effect of the main apses is quite that of chapels with ambulatories; the open space of each rises in a separate clerestory, pierced by coupled windows, and supporting a half-dome, the five chapels

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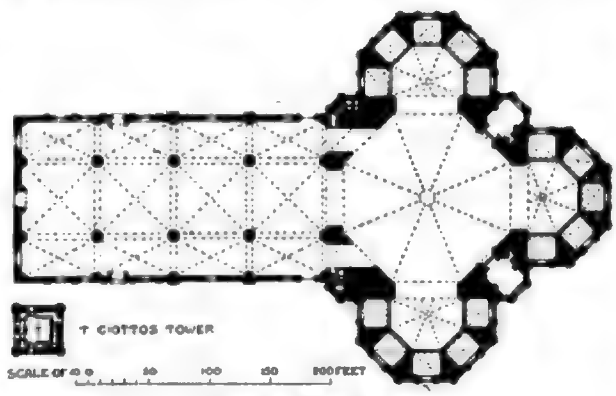
* See bibliographic note.

S. MARIA DEL FIORE, FLORENCE
Elevation of dome and substructure. (From Sgrilli)

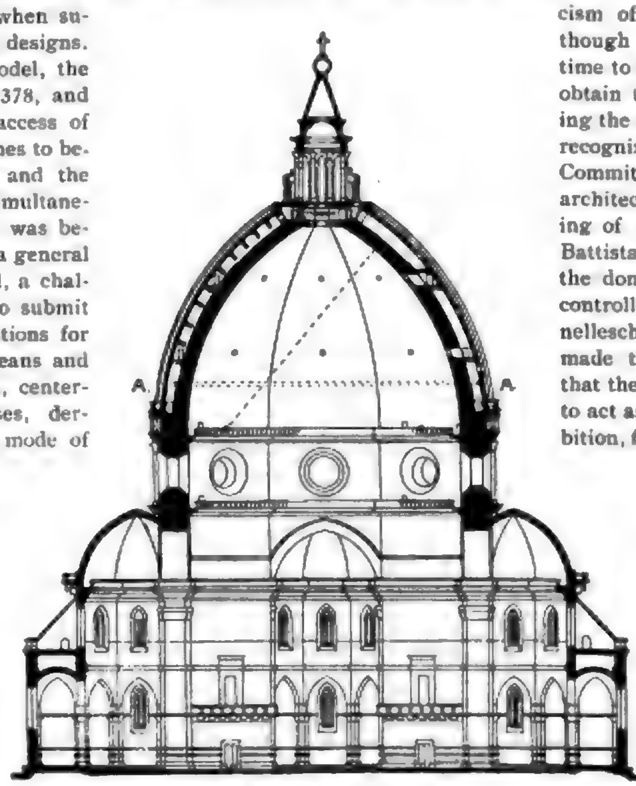
projecting from this space rising only to about half this height and separated by solid buttresses frankly expressed as wall masses.

Although a multitude of minor stipulations were made at various times and the dome itself was made the subject of a separate competition, with reference to its own construction, it would seem that this model of 1367 furnished so definite a line of direction for subsequent architects that their problems became increasingly those of execution solely. It would also seem feasible to assume that the original plan of Arnolfo, although altered in size, still retained its vitality, and that the complete east end plan was organically final as determined by the model of 1367. At any rate, an eight-sided dome, or, more properly, an octagonal cloistered vault for the crossing, had been projected from the outset and would seem to have formed part of every acceptable suggestion for the entire building in numerous competitions covering many years. Unfortunately authoritative information on this and other points is not available, since the design models, the only safe guides, were regularly destroyed by order when superseded by better favored designs. As based on the new model, the nave was completed by 1378, and two years later a great access of energy drove the Florentines to begin the four giant piers and the three branching apses simultaneously. By 1410 the drum was begun and, finally, in 1418, a general competition was published, a challenge to all and sundry to submit models, drawings, suggestions for the dome construction, means and machinery for its erection, centering, scaffolding, windlasses, derricks, materials, and the mode of their use.



S. Maria del Fiore, Florence
Plan. (From Simpson)

Lorenzo Ghiberti, already known to us as a versatile artist, submitted a number of models, one of them of brick, in the making of which he had employed four masons. Brunelleschi submitted, according to varying reports, either two or three models, in one of which, probably the second in point of time, he counted upon the help of Nanni di Banco and Donatello. His first model was his own; the third is hedged about with such doubt that it may here be ignored. The exact relation between the first and second it is difficult to establish; latest researches seem to indicate that the first was approved while still unfinished and was considered of such value that he was commissioned to undertake the second with the assistance of the two collaborators, who had in the meantime demonstrated their ability along the line of Brunelleschi's efforts. This was, of course, in accord with the usual practice in connection with the cathedral fabric, which denied the best artists the sole control and sought to achieve quality in cumulative fashion only. At any rate, this revised model was made of brick and was built *senza armadura*, without centering. Later, we find Ghiberti's name in conjunction with that of Brunelleschi in the instructions for the preparation of still another model. This was of wood, and the general opinion is that the two masters worked together in its production. As was the custom, all Florentines were invited to contribute to a general criticism of the work. Finally, as though submitting for the last time to its bugbear of attempting to obtain the best results by combining the efforts of good men without recognized headship, the governing Committee of Four appointed an architectural triumvirate, consisting of Brunelleschi, Ghiberti, and Battista d'Antonio as builders of the dome. It would seem that the controlling hand was that of Brunelleschi — he having jealously made the problem his own — and that the presence of the others was to act as a drag-anchor on his ambition, for his plans were not at any time granted more than reluctant sanction in the popular mind, despite their formal acceptance. It has been maintained that Brunelleschi was largely responsible for the last general competition, and some have ventured the *innuendo* that he was so certain of his own success that he persuaded the committee to institute the broadcast competition simply to



S. Maria del Fiore, Florence
Transverse section at transept showing giant piers, disposition of tribunes, relative thickness of concentric shells of dome. (From Simpson)

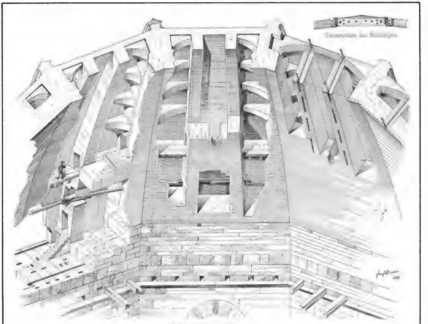
provide a large number of designs that might act as foil and background to the quality of his own. That his scheme of building was a daring one is seen in his own statement that he intended to do the work without centering. This is not to be construed literally, however, for we have an old drawing which purports to be a faithful representation of the centering and scaffolding used in the upper part of the dome.

Brunelleschi had not counted upon Ghiberti as a mentor. The latter's activity in regard to the dome had at all points concerned design and suggestion, but never practical construction. Both architects had their supporters; intrigue developed; finally Brunelleschi even spent a short time in jail. His ability was bound to have its effect in the end, and, knowing this and fully assured of Ghiberti's vulnerable spot, he rid himself of his estimable compeer by a ruse, feigning illness, which promptly stopped all building. Battista d'Antonio cut so small a figure that his activity soon became merely nominal.

Whatever these difficulties may have been, the joint model of Brunelleschi and Ghiberti for the dome proper was definitively accepted and in 1420 a program of construction or table of specifications for the finished work was drawn up. A discussion of these specifications will, with certain restrictions, provide an analysis of the construction of the actual dome.

II.

The Florentine dome is the first example in Christian architecture in which the full sweep of contour * is frankly expressed and effective from spring to crown. This is due chiefly to the particular type of internal construction which made possible the elimination of counterweights, or members rising to a given height on its exterior and serving as a kind of completely circular anchor buttress, as is the case in the Roman Pantheon and, in different fashion, in Byzantine drum and dome systems which were largely developed out of similar principles. No doubt this advantage had formed part of the conception of many an earlier designer, possibly even of Arnolfo's.



S. Maria del Fiore, Florence

Diagram showing structural system of dome, relative thickness of shells, character of masonry, disposition of main and intermediate ribs, passages, cincture, and other motives. (From Durm)

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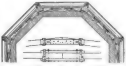
* The question of the contour is considered throughout as the one point from which no deviation was permitted. We find in the specifications the words: *la cupola ha misura di quinto acuto*, a clause signifying that the line of contour is set down as the arc whose radius is four-fifths of the diameter of the dome, *i.e.*, from corner to corner of its octagonal base. What is more, to refer to syntax purely, it is noteworthy that the indicative mode, *has*, appears in this statement, while in all other parts of the program involving new work the usual subjunctive form *should* appears. From this it would seem that the contour of the dome was in general a matter of settled history before Brunelleschi's time, and that at least to this extent the founder of the Renaissance in architecture figures more prominently as constructor than as architect proper.

What is more, the work of the dome building had been carried up a short distance — its verticality of contour having made this possible — when the specifications of 1420 were approved, and a decided indication of its prospective silhouette had therefore been at hand for some time. It becomes, then, a problem of completing work already under way, although this aspect of the task does not by any means reduce the structural obstacles to be encountered. We should not, in view of these circumstances, hesitate to give proper credit for unusual farsightedness to the audacious fourteenth century masters — whose conception the dome as we have it really was, and who ingenuously looked upon their task as one quite within the possibility of their own achievement.

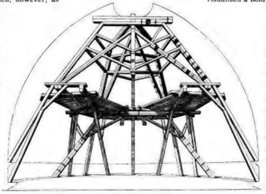
Baptistery of Florence

The specifications called for a dome of two shells, with void between. The question at once arises: had this form of construction any definite prototypes, and what were its precedents? While suggestive examples existed in a number of places, Florence itself included, the structural system of this dome is not in any sense a duplication of any building then existing. Antiquity knew no such system, although it has been suggested that Brunelleschi derived his inspiration possibly from Roman skeleton rib vaults with horizontal bond courses, or more particularly from the Baths of Gallienus, which show a dome of semicircular section, supported on a decagonal substructure with ten brick ribs rising from the angles and striking against the rim of an oculus above, and twenty intermediate ribs which, however, as though to spoil the suggestion, do not rise the full distance to this rim. The prōminent example of the Pantheon itself could offer but little in the way of structural study, since its structural system was not then even partially understood. In effect, however, its inspiration must have played a considerable rôle in Brunelleschi's ambition in Florence, due to his study of ancient architecture in conjunction with Donatello, although the desire of Florence was for greater height and for pronounced exterior effect. In similar fashion the lesson of Hagia Sophia, which he had not seen, could be of slight assistance. There were good Byzantine examples in Italy at no great distance from Florence — buildings using domes on drums but carrying the latter up to a point on the haunch and partly concealing the dome curve. There were also good medieval examples at Aachen, which is covered with a sloping roof, and at Pisa, which is elliptical in plan and of high section. A number of Italian baptisteries might have offered more than impartial suggestion: Florence, Parma, Cremona, for example. Of these the one at Florence, with which that at Cremona is practically identical in construction, is perhaps most interesting in this discussion. This twelfth century building is eight-sided and surmounted by a pointed brick dome, springing from within the drum, with eight heavy angle ribs and sixteen lighter intermediate ribs, two on each side, numerically at least the exact equivalent of those in the duomo. The objection to this as a final model for Brunelleschi was that on each of its faces rise three barrel vaults whose height diminishes with the rising contour of the inner dome until they die against its crown, *i.e.*, until their outer uniform plane becomes tangent to the curve of the dome; these vaults are covered by a low conical pen roof. This arrangement eliminated all exterior expression for the actual curve of the vault, and the Florentine mind had too long visualized a bold dome motive on the cathedral as the hub of the city of the arts. Finally there was Arnolfo's dome as pictured in a fresco in the Spanish Chapel in S. Maria Novella, which shows a dome of bolder contour, — possibly a painter's modification, — but indicates the same general exterior treatment of the finished work. This was considered the actual conception of Arnolfo as conveyed to his successors, by them held inviolable, and quite probably incorporated in the



Cincture of Chestnut Beams and Mode of Making Joint

See A in section. (From Simpson)



Brunelleschi's Scaffolding

(From Nelli)

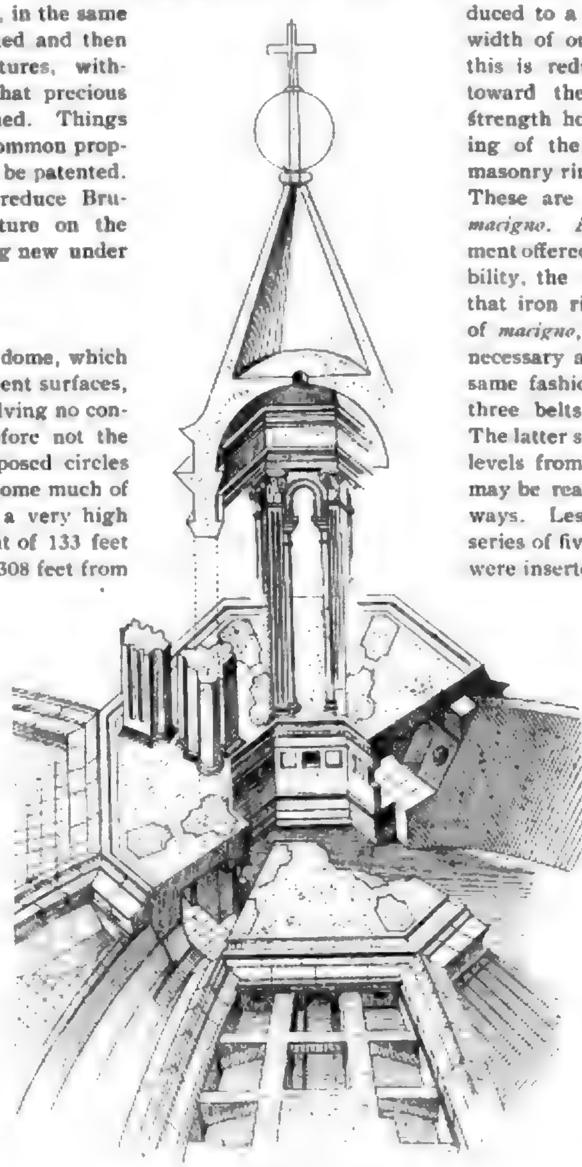
design of the eight artists of the fourteenth century — Orcagna undoubtedly the leading spirit among them — whose ability has never been given due credit in this connection.

The construction of the dome, then, is supposedly inspired — quite obviously so, to a number of critics — from the Baptistery of San Giovanni in the same city, the effect being that of the whole baptistery dome construction elevated upon a drum. It would seem, however, that Brunelleschi's modifications were of such importance — if modifications they are conceded to be — and the magnitude of his problem imposed such aggravated difficulties that he should be entitled to repute beyond that of the copyist. He was distinctly an adapter — great architects are always so classified — and he used the examples, forms and means at his disposal as the legitimate point of departure, in the same sense that the Roman adopted and then adapted certain Greek features, without loss of originality — if that precious quality be properly construed. Things already in general use are common property and cannot, so to speak, be patented. It is bootless to attempt to reduce Brunelleschi's architectural stature on the premise that there is nothing new under the sun.

III.

In actual construction the dome, which consists of eight interdependent surfaces, is of the cloistered type, involving no continuity of surface and therefore not the suggested series of superimposed circles which give to the uniform dome much of its strength. It is built to a very high section, and achieves a height of 133 feet from its springing, or about 308 feet from the pavement, with a maximum diameter of 138½ feet. The drum, which forms its immediate support, measures 40 feet in height; its walls are 16 feet thick and each of its faces is pierced with a circular window similar to those of the nave clerestory. For nearly half its height the dome is built of carefully selected stones clamped and doweled together; the remainder is of brick. The two shells exist separately above a point about 16 feet beyond its spring, or nearly 8½ feet above the point where its curvature begins. The inner shell is, obviously, the heavier, measuring 7 feet in thickness, and is built in three stages, their thickness decreasing slightly upward. The thickness of the outer shell is practically uniform, varying only about 7 or 8 inches between base and crown. The void between the shells, which measures from 4 to 5 feet on the radius of the dome, is used for the disposition of stairways and passages.

As for the construction in detail, we find again in consulting the specifications that the dome was to rely upon eight major and sixteen minor ribs, the latter spaced evenly two upon each side and all rising the full height from drum to oculus above which the lantern appears, and all of the full thickness of both shells plus the space between them. Both sets of ribs decrease slightly as they rise, both in width and in thickness or depth. By this means of construction each dome face, measuring at its widest point about 53 feet, is in its free surface reduced to a passive area of an aggregate width of only about 13½ feet, and even this is reduced still further as it rises toward the crown. To gain further strength horizontally and for the fastening of the shells to one another, three masonry rings were built into the fabric. These are of a type of slate known as *macigno*. As though even this arrangement offered insufficient assurance of durability, the original specifications require that iron rings be inserted around those of *macigno*, but these were not considered necessary as the work went on. In the same fashion six instead of the executed three belts of slate had been specified. The latter serve also to provide easy access levels from which all parts of the interior may be reached by interconnecting stairways. Less easily explained are the eight series of five segmental arches each, which were inserted between the major ribs, and which pass through the minor ribs; these are placed radially with reference to the hypothetical center of the dome. The real effectiveness of these arcuated members has yet to be discerned. A further binding feature in the form of an armature of chestnut beams was introduced at a height of about 10 feet above the first circular passage. The program required five of these, but their utility would have been questionable above the haunch of the dome. As additional cinctures, chains were embedded in the solid masonry of the base. The lantern is only casually mentioned in the specifications. This feature



S. Maria del Fiore, Florence
Diagram showing position and construction of lantern and treatment of crown and oculus of dome

was not a new one, but had never been given its adequate scope. There were then extant praiseworthy, though hesitating, examples in Pisa and Siena, as well as in Florence. The lantern should, in this case, be considered a necessary terminal feature for so large and massive a silhouette. It also demanded greater projection of the major ribs on the exterior, and so established a fine unity of leading lines, and more especially of structural design.

New conferences held in 1424-25 led to a new set of specifications. Ghiberti's name still appears, and he is still credited, as was the case throughout his connection with the work, with a higher stipend than Brunelleschi. The new program required the small circular openings now appearing in the dome, it being stated that these were not only for light, but chiefly as points of support for the scaffoldings of mosaicists. Experience demonstrated from time to time in course of construction that changes were feasible or advisable in the interests of better construction and of economy of materials. What is more, Brunelleschi, being himself responsible chiefly for both specifications and execution, was permitted to use considerable initiative.

The finished dome was dedicated in August, 1436, but the lantern, for the design of which Brunelleschi and Ghiberti were again in competition, was not completed until 1467. An arcaded loggia around the base of the dome was begun during the fifteenth century by Baccio d'Agnolo; it was completed along one side of the octagon when the undeserved ridicule of Michelangelo caused it to be abandoned. It should be noted that after 1433 Ghiberti's name no longer appears in the accounts of regular expenditures. In 1443 we find record that Filippo Brunelleschi is to be declared architect of the duomo for life on condition that the lantern be satisfactorily completed, a ridiculous stipulation in view of his services up to that time. The honor was to be accorded him, says the Latin text, for the building of the dome and the lantern. Thus the lion and the mouse were brought together as equals. And Brunelleschi had been in sole charge of the works since 1423! He died in 1446, twenty years before the lantern was finished, and so forfeited the nominal honor which the quibbling Committee of Four had brought itself to concede.

S. Maria del Fiore, Florence
Half section and half elevation of lantern. (From Sgrilli)

Bibliographic Note. Since it was not possible to include in the foregoing any deeper critical discussion of the dome fabric, nor to give its history in detail, the following list of works of reference is added for the convenience of those interested:

Anderson: Architecture of the Renaissance in Italy, London, 1909; Cummings: History of Architecture in Italy, New York, 1901; Durm: Die Baukunst der Renaissance in Italien, Leipzig, 1914 (*in* Handbuch der Architektur); Durm: Zwei Grossconstructionen der Renaissance in Italien, *in* Zeitschrift für Bauwesen, 1887; Fabriczy: Filippo Brunelleschi, sein Leben und seine Werke, Stuttgart, 1802; Frey: Le vite di Filippo Brunelleschi, scultore e architetto fiorentino, scritto da Giorgio Vasari e da anonimo autore (Manetti), Berlin, 1887; Frey: Vita di Lorenzo Ghiberti, Berlin, 1886; Guasti: La cupola di Santa Maria del Fiore, Firenze, 1857; Guasti: Santa Maria del Fiore, la construzione della chiesa e del campanile secondo i documenti, Firenze, 1887; Moore: Character of Renaissance Architecture, New York, 1905; Nardini: Filippo di ser Brunellesco e la cupola del Duomo di Firenze, Livorno, 1885; Nelli: Discorsi di architettura, Firenze, 1753, with which is bound: Cecchini: Due discorsi sopra la cupola di Santa Maria del Fiore; Norton: Church Building in the Middle Ages, New York, 1880; Sgrilli: Descrizione e studi dell' insigne fabbrica di S. Maria del Fiore, etc., Firenze, 1783; Simpson: History of Architectural Development, Vol. 3, New York, 1911; Wenz: Die Kuppel des Domes Santa Maria del Fiore zu Florenz, Berlin, 1901.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE architect is primarily an artist no less than the painter or sculptor. His first thought in creating the design for a building is to have it possess certain qualities of beauty, to accord with the vision which his imagination brings before his eye. He conceives his building in mass with bold shadows and high lights to screen the detail, much as the sculptor shapes the contour and mass of a sculptural group. Unlike the painter and sculptor, however, the architect is not always permitted to carry to completion his design by his own personal effort, nor is he free to make it represent only his artistic ideas. He is surrounded from the first with considerations which impose severe handicaps upon creative ability.

The actual production of architecture entails the labor of many more persons than that of the designer, yet his must be the guiding hand of all if the result achieved is to be a correct and sympathetic execution of his design. Clients are in general concerned only with securing a useful and efficient building to meet their needs, and consequently look upon the architect only as a necessary medium through whom they can best secure what they want. The architect is rarely consulted as an artist; he is too often employed primarily to direct practical operations in a practical way. Since there are, strictly speaking, no patrons of architecture as there are of the other arts, and but few clients who build with the principal thought of giving concrete expression to an architectural design, it devolves upon the architect alone, in the average instance, to find the enthusiasm and desire to make a building beautiful. He is by force of these circumstances compelled to approach his art in a spirit of compromise: on the one hand he has his ambitions as an artist to satisfy; on the other he has certain practical considerations of planning, accommodation, and cost, determined by his client, to satisfy. He plays, therefore, a difficult rôle even when he is fortunate enough to have a client who recognizes that profit and pleasure may be derived from an architecturally beautiful building. Even then many of his reasons for employing certain methods of treatment or securing scale among component parts must be misunderstood because of the lack of a complete knowledge of architecture on the part of his clients.

In the designing of residences he more frequently meets with appreciative clients than in other classes of work, but even here conditions exist which are a source of much distress to his artistic predilections. The designing of a home has all the elements of interest in it that appeal to the creative imagination of the artist, and what architect does not experience pleasure when he thinks of the country house that he might design under ideal conditions? With the attraction that residential design has for the architect it would seem that our domestic architecture ought to be of a high order. It is given to but few designers, however, to work under ideal conditions for the creation of domestic architecture, and this may in great measure be taken as the reason for the lower order of architecture that prevails in many instances to-day.

In the design of important residences where the architect meets with fewer restrictions of severely practical nature he is able to express in his buildings the personal tastes of his clients as he interprets them and provide a background for their lives that is in perfect accord with their individuality.

The well informed and appreciative client is eager that not alone in the design of the exterior of his house shall the architect be the arbiter as to what constitutes propriety and architectural excellence — he desires the latter's influence to extend to the design of each individual room and to the selection of the furniture and fittings that are to complete its livableness. It is to be regretted that such appreciation of the architect's ability and respect and admiration for his art are not manifested on the part of more clients, for with them the quality of American architecture would be immeasurably increased and the examples of well designed interiors utterly spoiled by association with inappropriate, if not ugly, furniture, and hangings would be less frequent.

Architects, however, have the opportunity to influence these conditions for the better, and they should make a special effort, in justice to their own work and the standards of their profession, to educate their clients to a fuller appreciation of the dependence of the architectural design of an interior upon its proper furnishing and decoration to make a completely satisfactory result. Only with such a spirit on the part of the client and a desire on the architect's part to furnish his advice in matters of furnishing after the structure has been completed can be sure that his finished work will truly represent him.

WHEN the large auditorium at the University of Illinois was built in 1908 it proved to be unsatisfactory in its acoustical properties. Audiences found it difficult to hear speakers owing to marked reverberation and echoes. Dr. F. R. Watson of the Physics Department and James M. White, Supervising Architect, undertook to correct this fault by conducting a systematic investigation involving a long series of experiments. "Bundles" of sound were projected in different directions and the paths of these were carefully traced. Various instruments, such as a ticking watch, a hissing arc lamp, and megaphones were employed, and curtains and draperies were hung at critical points suggested by the diagnosis.

Certain of the walls were then covered with hairfelt mounted on thin furring strips, with the result that at present a speaker may be heard distinctly by auditors in the most distant seats of the large building.

The investigations are described in detail in an illustrated booklet issued by the Engineering Experiment Station as Bulletin No. 87. Copies may be had by addressing W. F. M. Goss, Director, Urbana, Ill.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

SEPTEMBER
1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING
ROGERS AND MANSON COMPANY PVBLISHERS

MICHELANGELO BUONARROTI

BORN IN FLORENCE, 1474. DIED IN ROME, 1564. ARCHITECT OF LIBRARY AND SACRISTY OF S. LORENZO, FLORENCE; DOME OF ST. PETER'S, FARNESE PALACE, AND PALACE OF THE CONSERVATORS, CAPITOL, ROME

THE BRICKBVILDER

VOLUME XXV SEPTEMBER, 1916 NUMBER 9

Does it Pay to Improve Manufacturing and Industrial Buildings Architecturally?

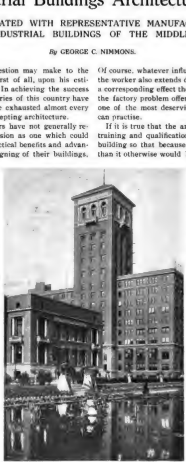
ILLUSTRATED WITH REPRESENTATIVE MANUFACTURING AND INDUSTRIAL BUILDINGS OF THE MIDDLE WEST.

By GEORGE C. NIMMONS.

THE appeal which this question may make to the individual must depend, first of all, upon his estimation of its importance. In achieving the success which the manufacturing industries of this country have attained, it seems that they have exhausted almost every source which could aid them excepting architecture.

The manufacturers and owners have not generally regarded the architectural profession as one which could help them much in securing practical benefits and advantages in the planning and designing of their buildings, and on the other hand it seems as if the architects generally have not cared to enter this field of work.

As far as the architect is concerned I do not believe that he generally realizes the importance of the factory problem nor appreciates the opportunities which he as architect has for doing big things for one of the most important business interests of this country. This is a commercial and industrial nation first of all, and yet architects generally have not entered this field of work to any considerable extent. The factory problem must certainly appeal to the architect on account of the size and nature of it. There are altogether over six million, seven hundred thousand people engaged in manufacturing in this country, and in addition to these people are their families which average four and a half persons to the worker, making a total of over thirty-four million people, which is just one-third of the entire population of the United States.



View of Tower, Sears, Roebuck & Co. Plant, Chicago, Ill.
Nimmons & Fellows, Architects

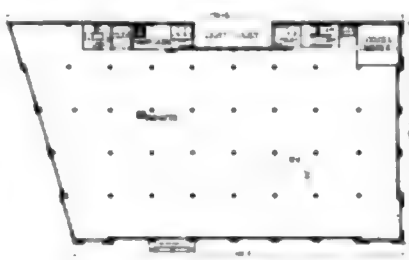
Of course, whatever influences and affects the welfare of the worker also extends down into his home and produces a corresponding effect there, so that we can truly say that the factory problem offers to-day one of the largest and one of the most deserving fields in which the architect can practise.

If it is true that the architect is able, on account of his training and qualifications, to design and plan a factory building so that because of his services it shall be better than it otherwise would have been for the welfare of the employees and for the economic and profitable manufacture of the product, then the architect who enters this field is surely doing something well worth while. It seems, on the other hand, that if architects do not assist with this problem that they are ignoring the spirit of this commercial age, and are also missing one of the greatest opportunities for success offered them in our times.

In spite, however, of the general disinclination of architects and owners to get together for a better solution of this problem, there have been a few architects and owners in recent years who have undertaken the solution of some of these problems together. What they have accomplished is perhaps only the beginning of bigger things to come as the work develops. Yet the changes that have been brought about in these cases and the unexpected improvements that have been made in factory and industrial buildings in some instances have attracted considerable atten-

tion and caused many people to wonder what the real reason and motives behind them were. The practical business man who is not familiar with them wants to know why some of our manufacturers and the heads of some of the big industries of the country have undertaken such movements and reforms. Is it all for philanthropy? Does it affect the profits of the concern? Is there anything to it which would tend to better the quality of the product handled? Does it improve the efficiency of the men and the quality of the work they do? Has it even a bigger and more far-reaching meaning? Can it properly be classed with a movement to benefit humanity? These are big questions and yet the reasons and the motives behind these men who are doing so much to improve factory and industrial buildings and the condition of the employees seem to be just as big and important as the questions asked. It undoubtedly is true that some who have gone in for these reforms have been actuated by purely selfish motives of profit; yet it often happens that the prerequisites and essential conditions for the highest efficiency and success financially nowadays are so intimately connected with these conditions and provision for the welfare of the employees and advantages of a high-class building that one cannot be separated from the other, and the owner who would make the most money is the owner who has adopted these big reform movements.

Rogers & Company Building, Chicago, Ill.
Mundie & Jensen, Architects



First Floor Plan

It does not seem fair, however, to attribute the majority of the credit for modern industrial reforms to selfishness, because the fine things that are being done for many big plants go way beyond the point required for maximum profits. Undoubtedly the cause of humanity still has many true friends and adherents, and not a few of these can be found among the heads of big industrial plants.

On the other hand modern competition, aided by science and art, in manufacturing has set a pace so rapid and has necessarily intensified and speeded up the activities of the industries to such a degree that the conditions under which employees now work are far more severe and trying than they ever were before, and in addition to this the manufacturer is obliged on account of this competition and the shortening of working hours to secure the greatest efficiency in his plant, together with the most economic methods of operation in order to succeed in his business, so that now we have a situation where the employer is eager to take advantage of every agency that can assist him, and where the employee is in need more than ever of better conditions under which to work.

A more auspicious time for architects generally to enter this field could not have been devised, and on account of the inviting opportunities for success open to them they cannot fail to achieve results well worth the doing.

Coming now to the discussion of what an architect can do for the improvement of factory and industrial buildings, there appears to be more than any one writer could suggest or describe. It is the object, however, of this article to take up only those things which most obviously fall within the scope of an architect's work and to illustrate in a general way some of the results obtained.

In the study of a factory or industrial building the first thing an architect would naturally undertake to do would be to beautify the building or at least make it interesting. The question would at once arise as to the added cost. But before we come to that there is one other thing that the trained architect would do that stands first in the consideration of the problem. He would study the requirements from all sides of the particular industry in hand. He would learn at least in a general way the essential processes and methods of handling the material and the product of the plant. He would then make a comprehensive plan that would provide for the future growth and would also provide for the ideal manufacturing or handling of the product, so that there would be no waste either in labor or the travel of material. The lighting, the ventilation, the sanitation, the safety, comfort, and convenience of employees, the insurance and the surroundings of the plant are also important features which he would take up in turn and adequately provide for. With these problems well in hand the designer, then, is in a position to mould them around in his plan and work out his elevations so as best to secure that other quality of the problem,—the beauty of the building and its surroundings.

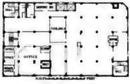
It is commonly supposed by the laity that whenever an architect undertakes to make a manufacturing plant attractive or beautiful in design, that the cost for constructing it is immediately increased materially and indeed often beyond the means available for such structures. The fact that this is absolutely untrue can perhaps best be shown by a few statements and the presentation of concrete illustrations of some buildings where costs are given.

In the first place, attention should be called to the fact that there are a great many essential elements in the construction of every building, such as piers, lintels, sills, openings, copings, gables, etc., which, without adding any unnecessary expense to the cost of the building, may be grouped, moulded, spaced, and so designed that they will add great interest to the exterior. Often the skilful

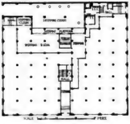
designer can take the same elements of construction present in a very severe and unattractive façade and by transposing them around and moulding them into shape make of it a very beautiful building. Beauty in buildings, of course, is not attained by plastering on expensive ornamentation, and the architect knows how to secure it without resorting to the addition of unnecessary and expensive materials.

There are some architects who are very clever in the use of brickwork whereby most attractive designs and patterns are secured by placing bricks in and out of the common plane of the building. These masses of brickwork make projections and depressions which with their shadows produce ornaments, or they may emphasize or express in a most interesting manner the construction of the building or its use. Then again there is the opportunity in brick-pier construction of building the offsets of the piers outside of the building instead of inside as is the general custom. By placing the offsets outside as the pier goes up and grows thinner, the effect of a buttress construction is made which in itself is a most fertile means of adornment, as is so well exemplified in the old cathedrals. These methods of securing architectural design employ absolutely the same materials as would be used in the plainest of buildings and therefore add no additional expense as far as the materials are concerned.

National Candy Co. Building, Minneapolis, Minn.
Hewitt & Brown, Architects



First Floor Plan



First Floor Plan

Western Newspaper Union Building, Chicago, Ill.
J. C. Llewellyn, Architect

Then comes the question of color. This thing which is so sensitive and sometimes so evasive to conquer is a thing so powerful in its effect that the building may be absolutely hideous and unattractive, or it may appear perfectly suited to its surroundings and functions, and at the same time most attractive and beautiful, just in proportion as the question of color is properly and successfully handled. Color, as a rule, in these days of modern building materials is not a thing of extra expense, but a thing of good taste and proper selection. Brick, terra cotta, and other burned clay products can be secured in almost any tint of the rainbow at no greater cost for one color than another. The architectural palette from which one may choose without regard to cost is almost as large as that of the painter. The architect may, if he chooses, to suit some particular site make the whole building in monotone and match to one color the brickwork, terra cotta, and all visible materials, or he may undertake the more splendid effect of different colors and secure combinations as bright and gay as a flower bed. Bright colors properly combined are often a good antidote for coal soot and dismal surroundings. Different shades of color in the brick are a most effective means of working out patterns and designs in a wall that often make it most interesting. Two of the most difficult problems in color selection are the widely varying carrying qualities of different colors and the effect of dirt on them after they are in the building for a while. Some colors in certain finishes carry a long distance, while others rapidly grow dim and change in character as the distance from them is increased. It often happens that after a most careful selection of colors from samples the effect is disappointing in the building because certain colors high up or far away from the common observation point do not carry, and lose their brilliancy and effect, thereby failing to produce the combination expected. It pays, therefore, to experiment and study the colors at long range, similar in distance to the distance from which they will be seen in the building.

Perhaps the most frequent disappointment or failure to secure complete success in color selec-

tion is that which results from timidity in handling brilliant colors. The more good taste a designer has, the more he seems to fear the possibility of some garish combination resulting from color selection, and rather than take the chance of this he frequently selects with ultra-conservatism and chooses those effects much lower in the color scale than the situation demands, and the result is consequently disappointing, particularly in the city atmosphere after the first covering of coal soot has been deposited. The writer has often heard architects admit after their buildings had been completed, and on which the color had not come up to their expectations, that they had really been afraid to go in for the strength of color which the problems required. So long as the color scheme has to do with the combination of complimentary colors in their various shades and tints, it is usually the case that the most beautiful effect is obtained through a bold handling of strong and brilliant colors that will have carrying power, and that the dirt in the city atmosphere cannot screen from view after a few years.


Henneberry Building, Chicago, Ill.
Howard Shaw, Architect

Then again there are many features of factory buildings which provide opportunities for the designer to utilize architecturally without excessive cost. The most common perhaps of these nowadays is the requirement of the insurance companies for a sprinkler tank for fire protection. The insurance requirements for the size of the tank and its height above the roof of the building are nearly always such as will make a beautifully proportioned tower in case the tank is enclosed with walls and roofed over. To construct enclosing walls and roof around such a tank adds comparatively little to the cost of the essential supports of such a tank, for the reason that such walls can easily be carried on brackets or shelving attached to the tank supports, and the walls themselves need not be of heavy or expensive construction. Such a tower, as a rule, has the effect of producing a dominant feature in the architecture of a plant and may be of great beauty and attractiveness in contrast to the unsightly, ugly water tank which often kills the architectural design. There are practical advantages for such towers that are of considerable importance. The tank itself is protected from the weather and the consequent freezing of the water, and deterioration of the materials and supports of the tank are thereby avoided. It also provides a place for other water tanks such as are often connected with the plumbing of a building, and the additional area of several rooms in the shaft of the tower below the tank frequently furnishes some very useful, quiet, and well lighted office space.


Jelke Building, Chicago, Ill.
Huehl & Schmidt, Architects

The necessity of constructing skylights, monitors, and ventilators on the roof, again sometimes provides a suggestion for the architectural design in the elevation of the building that may be moulded into gables, or other forms following the sections of the skylights, which are correct expressions of the structure and function of the building.

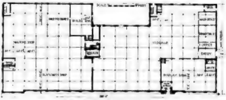
These are only some of the leading features constantly occurring in the problems of manufacturing and industrial plants which give to the architect his opportunity for designing façades of great interest and attractiveness.

The architect and builder can readily appreciate how the constructive elements of a building can be handled at small extra expense so as to make the building attractive and beautiful; but the owner who is unfamiliar with these things usually desires something more convincing than such statements. I do not know that any architect has ever made public the actual cost in dollars and cents of the results of his efforts to make a building attractive in design; but in order to try and throw some light on this question I have taken a building which I consider is fairly typical of factory buildings in its requirements and used it as an example to illustrate the extra cost involved.

For the purpose of

making a comparison an illustration of the C. P. Kimball Factory Building is presented, and in addition a design for the same building in which every single thing which might add to its attractiveness has been taken away. This design shows it with its ugly sprinkler tank on stilts above the roof and all the characteristic barren boldness of the "strictly utilitarian factory design." The contractors, Selden, Breck & Co., who built the building made an estimate of the cost to build the same building according to the "utilitarian design" and the results are as follows:

"Utilitarian Design" for C. P. Kimball Building, Chicago, Ill.



First Floor Plan, C. P. Kimball Building

The Kimball Building cost approximately $326,000. The same building, as estimated by the contractor, would have cost, if built at the same time according to the "utilitarian design," $311,043, so that the total saving which could have been made by adopting the latter design would have been $14,957. In other words, this relatively small additional expense saved this building from being an ugly eye-sore in the landscape.

In the experience of the writer there is not one owner in a hundred who would expect this difference in cost between these two designs to be anywhere near the low amount it is. They would more likely assume that such a striking difference in the two designs would cost from $50,000 to $75,000.

Take, for instance, another example: the Administration Building of Sears, Roebuck & Company illustrated on page 222. Almost the entire ornamentation of this building is secured by the use of terra cotta. The total cost of the terra cotta or the amount of the terra cotta sub-contract was $34,000 and the cost of the building over $650,000. The greater portion of this terra cotta consists of window sills, lintels, copings, and base courses which are essential elements in the construction of the building, and could not be omitted in any design for this building, no matter how plain and unattractive the design might be — not even if we succeeded in getting it into the strictly "utilitarian design" class. These elements are a necessary part of the enclosing walls of the building. The ornamentation might be taken off the face of the lintels, but this ornament is made from moulds and its cost

C. P. Kimball Manufacturing Building, Chicago, Ill.
George C. Nimmons, Architect

is very nominal. Other material, such as cut stone, might be used, but as a rule the cost of cut stone sills, etc., is about the same as terra cotta and besides this cut stone is more difficult to support than terra cotta lintels and does not make as good or as waterproof a coping as terra cotta, so that the majority of this terra cotta would be necessary for the enclosing walls of the building. If, then, we were to make this change in the building, all ornamentation would be removed and there would be nothing left but a plain, severe box of a building without anything to relieve its severity. The total cost, therefore, of all that is ornamental or interesting is only $12,000, or about 1.8 per cent of the cost of the entire building.

National Cash Register Company Plant, Dayton, Ohio
F. M. Andrews, Architect

Other buildings might readily be offered for further proof of the proposition under discussion, as many buildings which are most attractive in design are dependent almost entirely, as this one is, on the terra cotta and brickwork as the material and means through which the attractiveness of the design is secured. In every one of these buildings in mind the cost of the ornamental terra cotta which is not essential to their construction is relatively very small indeed when compared with the cost of the building.

Among the ornamental features of a building previously referred to was the enclosing of the sprinkler tank to form a tower in connection with the principal façade of the building. It was stated that in order to secure low insurance rates the insurance authorities usually require a large sprinkler tank above the roof. It was also pointed out that the tank with its heavy load of water, anywhere from thirty thousand to one hundred and sixty thousand gallons, required very substantial supporting columns and foundations, and that the additional strength in these supports necessary to carry enclosing walls was relatively small. This can readily be appreciated when the weight of the walls enclosing the tower is compared with the great weight of the water. As an example of such a tower the Reid, Murdoch & Company tower is shown. This tower is 38 feet square and 200 feet high. The water tank is steel and contains sixty thousand gallons of water. The estimated cost of all work to enclose the tank and form a tower above the roof was $16,000, which is only about 1½ per cent of the cost of the building. The tower is the dominating feature of the principal façade and there is no one thing in connection with the building that could have been utilized as economically as this for similarly emphasizing the design and giving character to the building.

The tower in the Kimball Building before referred to is 28 feet square and 108 feet high and contains a water tank of thirty thousand gallons. The cost to enclose this tower was $6,488. The water tank shown above the roof in the utilitarian design of this building shows more forcibly than words could describe how ugly such a tank is and how much it would detract from the appearance of any building. Another feature of this tower is that it has a belfry in which chimes of four bronze bells play a pleasant tune to mark the beginning and end of the working hours instead of the usual steam whistle and its jarring note. In connection with both towers above de-

Administration Building, Sears, Roebuck & Company Plant, Chicago, Ill.
Nimmons & Fellows, Architects

scribed, the additional floor space added by these towers should be taken into account when considering the additional cost.

In order to get some further testimony on this matter, a letter was written to Mr. Albert Kahn of Detroit, Mich., who has done so much in improving the architecture of the buildings for the automobile industry, and an expression of his views was asked. His letter in reply is as follows:

Albaugh Building, Chicago, Ill.
Howard Shaw, Architect

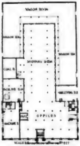
"Replying to your note of April 25th, I find no difficulty in convincing an owner that it pays to build factory buildings attractively, rather than without consideration of appearance. The difference in cost should not exceed 5 per cent of the total outlay. This means $5,000 on a $100,000 structure. The interest on $5,000 at 6 per cent is $300 per year — a sum any one would gladly pay for merely the pleasure of owning a well designed building, to say nothing of the advertising value of such or the increased efficiency of the employees because of such.

"I really feel that the matter of uninteresting, unarchitectural factory buildings is more the fault of the profession than the owner. With many architects even to-day — though less so than formerly — the factory building is something to be delegated to the office boy and is not considered worthy of their best. That the number of these practitioners is growing less is proven by the better work being done to-day.

"The principal thing now to be guarded against is the sacrifice of practical requirements in an effort to gain architectural results. The very root of good architecture is that it serve its function, and this applies to factory design as well as the more monumental building. Large areas of glass are necessary for proper work inside. To make a virtue of this requirement is the problem. Nor is it necessary for making the factory building attractive to lavish costly ornamentation, in fact, it often suffers in just about the proportion that such is used. Good mass, proper disposition of structural members, interesting skyline, and a judicious use in point of color and texture of the materials employed are the important factors, and these do not involve excessive expenditure. Therefore, there need be little need for convincing the owner that good-looking factory buildings pay. It is distinctly up to the architect."

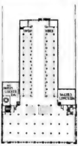
If, then, the opportunities are many, and at the same time not necessarily expensive for the architect to improve the appearance of these buildings, why should they not all be attractive or at least interesting? It would seem unnecessary to argue that beauty and attractiveness in buildings is desirable, as that is the distinguishing mark of advanced civilization; but the hard headed business man likes something less general and more practical as a basis for his indorsement.

The beautiful and attractive factory building has some very strong, practical reasons for its existence. In the first place it is a good advertisement. There is no one feature of a business concern, outside of the merit of its goods, which is as generally used to create a favorable impression among its customers as a picture of its building, provided it is substantial and attractive looking. Experience has shown that the customer expects a reliable and trustworthy firm to succeed well enough to have the means to build a suitable building, and if they have the means to build and do not, then they lack confidence in their own future success. Therefore, one of the essential elements of success is at least a substantial, first-class, attractive building. If it is not attractive it is no good



First Floor Plan

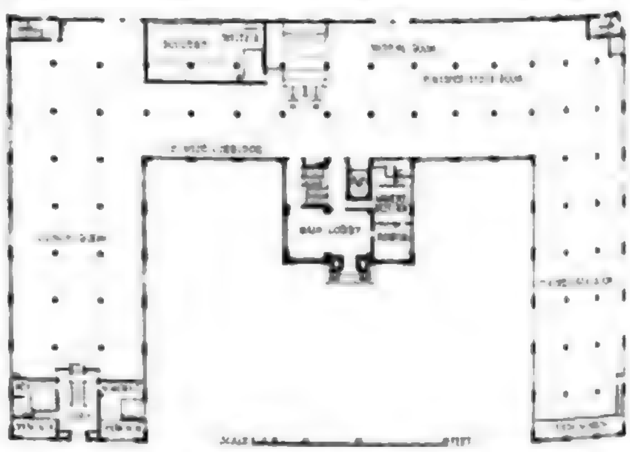
Schulze Baking Company Building, Chicago, Ill.
John Ahlschlager & Son, Architects



Second Floor Plan

GENERAL VIEW OF EXTERIOR

VIEW OF ENTRANCE PAVILION



FIRST FLOOR PLAN AND VIEW OF LOBBY

MANUFACTURING BUILDING OF RICHMAN BROS., CLEVELAND, O.

CHRISTIAN, SCHWARZENBERG & GAEDE, ARCHITECTS

for advertising and, on the other hand, the more attractive or beautiful it is, the more favorable attention it will attract and the more good it will do as an advertisement. It is hard to estimate the great value which a fine building is to the business of some firms. This advertising value must vary, of course, with the nature of the business; but as a rule there is an inseparable connection in the mind of the average customer between a fine building and first-class goods and a bad building and poor goods. Therefore if it pays to advertise, it pays to advertise through the medium of an attractive building, and the relatively small amount of money which an attractive building would cost over and above the cost of an ugly one can be very properly regarded as an advertising investment which will ensure ample returns.

A building that is beautiful, particularly if it is located in attractive surroundings, has a very beneficial effect on the employees and a wholesome effect on the owner as well. A man cannot help but be influenced by the character of a building and its surroundings which he has to go to and work in every work day of the year. Every bit of enjoyment or satisfaction which a person experiences is just that much uplift and assistance for performing the duties of the day; and if the building and its surroundings where a man works are such as to give pleasure and contentment on account of their beauty, then that building and its site are silently and perhaps unconsciously exerting a beneficial influence on all those around them.

Administration Building, Eastman, Gardiner & Co., Laurel, Miss.
Frank Arnold Colby, Architect

First Floor Plan

The feeling of loyalty among workers is also influenced by the character of the surroundings. It is much easier for a worker, if other things are equal, to pin his allegiance to a place that is beautiful and attractive than to one that is ugly and for which he could not have any feeling of pride. The *esprit de corps* of a body of workmen has a strong influence on the character of their work, therefore the pride which they may have in their workshop and the allegiance to their plant is a very important matter.

The benefit which every beautiful building is to a community and to a city has long been recognized, and it is always through the united efforts of the citizens in improving their buildings that a community or a city is made to grow and prosper. Every beautiful factory building benefits the owner by reason of the civic pride it fosters and the prosperity which it helps to bring to the community and the city in which it is located.

The improving and perfecting of factory and industrial buildings architecturally have as much to do with the conditions surrounding the workmen as with the beautifying of the buildings. The principal objects to be attained for the benefit of the employees are provisions for their safety, health, convenience, contentment, and the most favorable conditions for executing their work. A great deal has been done by many states and cities in requiring certain stairways and fire-escapes for exits in case of fire or panic. There is also the requirement of fire walls to act as a cut-off against the spread of fire into the different parts of the building. Yet in most cases the laws governing these things have been the result of some awful catastrophe where the loss of life has been sufficient to stir up public sentiment requiring action on the part of the public officials. Then these officials, usually the aldermen of a city, frame up some law to prevent the recurrence of the particular accident which happened in their locality. This law may not be comprehensive and usually is not sufficient to provide completely for the safety of the employees under all reasonable circumstances. The result is that laws vary in different localities, and there is hardly any locality which provides against all of the various horrible things that have occurred from time to time in different places. The benefit of the experience of the various localities might be gathered together and standardized for the whole country. At any rate, the architect can and will very likely provide for safe exits whether the law in the locality compels it or not. There is one absolutely vital requirement for the safety of workers in a wooden floored building of any particular height, and that is that there should always be not only fire-escapes, but real, ample, fireproof stairways enclosed in substantial fireproof walls.

In the fireproof building the architect can see to it that the fireproofing is really sufficient in case of fire to actually take care of the supporting and the load-carrying parts of the building. The prevention of accidents by machinery can be provided for in connection with the mechanical engineering.

The health of the employees is a matter for which the architect can do much. The three things in every building which are, of course, essential but which are not by any means always provided are good air, sanitary provisions everywhere, and proper plumbing. The various apparatus available for ventilation are so perfected that

a good, clean atmosphere full of oxygen, at any desired temperature and of any required humidity, can be provided for almost any building. Sanitary conditions can usually be secured by the use of proper materials, and designing and arranging the parts of the building involved, and as far as plumbing goes America leads the world in the perfection and excellence of its fixtures.

Jewel Tea Company Building, Chicago, Ill.
Nimmons & Fellows, Architects

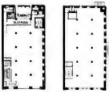
Another most valuable feature for the workers is the hospital in connection with the factory, whether it be a complete one in charge of a physician and nurses or whether it consists only of a room with a cot and a cabinet of medicines. At any rate it is a most humane institution and is often the means of saving lives and relieving much suffering.

To provide for the convenience of employees in a factory is just as much an architectural problem as providing for the convenience of members of a family in a house. There is nothing that frets workers so much as the failure to have things conveniently arranged, particularly when it puts them to extra trouble and annoyance. The needless climbing of stairs, or the unnecessary traveling of distances in the performance of their duties, and the failure to have things arranged for the convenient, economic handling of the product are frequently hindrances which prevent the operation of a plant to the best advantage. The matter of convenient arrangement in a building is one of the important things an architect is trained to do. No one can possibly eliminate defects of this kind in a plan more readily than an architect because it is part of his business to do so.

There are many contributing causes to the creation of a feeling of contentment among employees, yet it is most essential to have in order to secure their best work, their loyalty, and permanent service. Satisfactory wages, of course, is the first requirement, but in addition to that there are other things that are essential and some that have an important influence in securing contentment. Their safety, health, and convenience, as above argued, are essential; and among the important influences should be mentioned their recreation, their entertainment and enjoyment. A workingman gets little time away from the factory for these things, and it has been found by those who have given the matter a fair trial that it pays to make provisions for the recreation, entertainment, and enjoyment of employees.

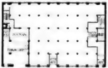
The old saying about boys working all the time applies in these days to men more than it ever did to boys because of the intensity of things and the nerve-

Ham Building, Chicago, Ill.
Perkins, Fellows & Hamilton, Architects

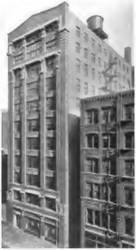


First and Typical Floor Plans
Arthur C. Dixon Building

Typical Floor Plan



First Floor Plan
Ham Building, Chicago, Ill.



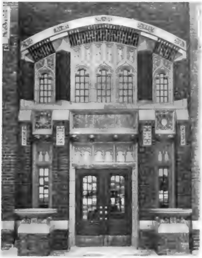
Arthur C. Dixon Building, Chicago, Ill.
Nimmons & Fellows, Architects

ENTRANCE TO Y. M. C. A. BUILDING, SEARS, ROEBUCK & COMPANY PLANT, CHICAGO, ILL.

NIMMONS & FELLOWS, ARCHITECTS

ENTRANCE TO AMERICAN BOOK COMPANY BUILDING, CHICAGO, ILL.

N. MAX DUNNING, ARCHITECT



ENTRANCE TO SEARS, ROEBUCK & COMPANY BUILDING, KANSAS CITY, MO.

GEORGE C. NIMMONS, ARCHITECT

ENTRANCE TO STEIN, HIRSH & COMPANY BUILDING, CHICAGO, ILL.

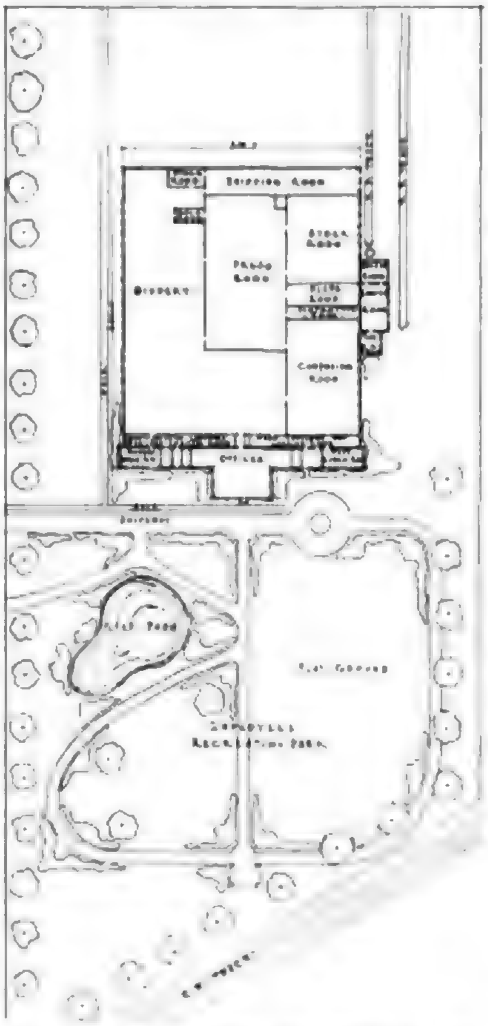
NIMMONS & FELLOWS, ARCHITECTS

racking methods characteristic of most modern day industries.

In addition to the above provisions for employees, the providing and arranging of the facilities of the building most favorable for the execution of their work is of course a most important matter which affects the owner as well. A building may be made to suit the work done in it most perfectly, or the reverse may be the case. The writer once saw a building so badly arranged that goods during the process of their manufacture were made to travel four times up and down the building before they were completed, while the fact in that case was that the material might have readily been assembled on the fifth floor and completely manufactured in one trip down to the shipping and stock rooms on the first floor. There is a great deal of lost motion and much time wasted both by machinery and men because many buildings are not arranged properly to suit the men or processes of manufacture. Poor light at the critical places in a building where the important work is being done has a great deal to do with the quality of the work; weak floor construction which does not safely permit things to be piled at points where it is desired to concentrate goods, posts in the road and ceilings too low — all such things and many more are the result of ignorance and inability to plan and arrange a building properly on paper before it is built, and yet these are the very things an architect is trained to do and provide for better than any one else.

We might continue and say a great deal more about defective factories and industrial buildings and point out the damaging effect they have upon the output and the success of the concerns occupying them, but it might not be interesting and we want to add a word more about the workman himself, and then we are done. The value of a workman does not depend alone upon his ability or dexterity in his trade. The uniformity, the quality, and the quantity of his product depends to an important extent on whether or not he is contented; whether he is well, happy, and interested in his work. It might be argued that those things have little to do with labor capacity, and the man only works because he is obliged to make a living; yet we positively know that the human machine will never operate at its best under force or compulsion alone. It will wear out sooner and can never perform its functions ideally unless there is at least contentment, satisfaction, and an interest in the work.

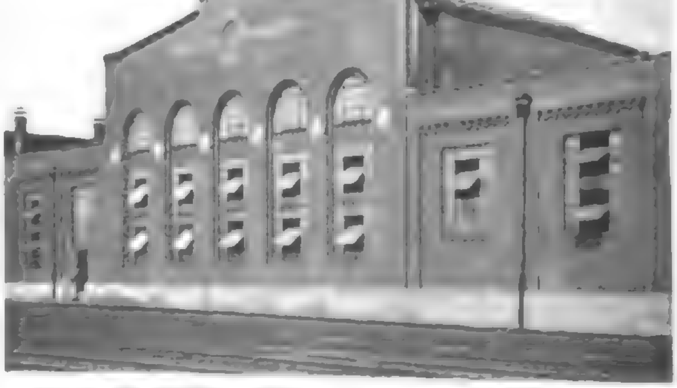
Entrance to Offices, W. B. Conkey Plant



Plot Plan, W. B. Conkey Plant, Hammond, Ind.
George C. Nimmons, Architect

The sordid, unattractive, unsanitary workshop cannot, from the very nature of the case, produce the quality or quantity of work by the men which a first-class, properly equipped shop can. The human machine must have the right conditions in which to work at its best, and therefore it is absolutely true that every single thing which a manufacturer can do within reason to improve the conditions and surroundings of his men is adding just that much profit to his business, and, at the same time, adding just that much benefit to the lives of his employees. The rapidity and intensity with which a man nowadays is compelled to work absolutely demand for the best results that his condition and surroundings be greatly improved over the old state.

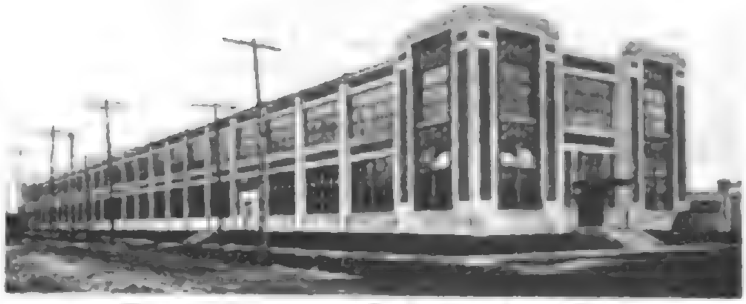
Again the workman's worth as a citizen in a community, and his true merit as a husband and father in his home, depend to a considerable degree on what his daily life is and the conditions surrounding it. There are at least eight hours to the working day, and they are sometimes long and weary ones. When these dreary times come it is a wonder that more men do not give up and succumb to the alluring freedom and independence of the vagabond. Nature evidently never intended a man to work quite as hard for his daily bread as factory workers do, and it is strange that they can resist as well as they do that inborn, persistent, and natural longing for freedom and the beauties



Central Bay of Engine House, St. Louis, Mo.
Klipstein & Rathmann, Architects

of nature which were all intended for man, but which the factory worker hardly ever enjoys.

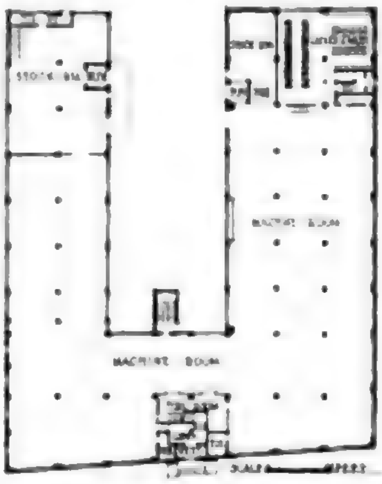
A man is swayed sometimes by small influences and it often only needs the slightest overbalancing influence of good to keep him steady and faithful to his duty. The factory and its surroundings are often responsible for just that needed influence for good or bad. In one case it may mean the ruination of a man and also his home, and in the other it may mean his salvation. This may seem to be enlarging the influence which the factory exerts over its employees, and yet any one who has seen the dreadful conditions of not only a few, but a great many, factories in this country knows differently. Some of them are so bad that the wonder is that human beings can exist under their conditions as long as they do.



Diamond Manufacturing Co. Building, Detroit, Mich.
Smith, Hinchman & Grylls, Architects

This, then, I believe, presents some of the principal phases and aspects of the factory and industrial building problem. The field is wide open to the architect — in fact, it invites him, because of his peculiar fitness for the work, and I do not believe that there is any agency that can do as much now for this big problem of our times as the architect.

Finally, we might very properly, in connection with this whole subject, undertake to summarize the results of those employers who have done the most for improving the conditions of workers and who have taken the lead in having their own plants developed architecturally, yet generalizing these results would be difficult and probably not as effective as the presentation of some concrete examples of the way these problems have been handled. We will, therefore, give a brief description of a few instances of these cases which may be taken as illustrations of what some of the most progressive concerns have done in this direction.



First Floor Plan

Eighteen years ago the printing and book publishing firm of W. B. Conkey Company moved from an ordinary seven-story building in Chicago to a new plant which had been specially designed and erected for them at Hammond, Ind. Up to that time the sawtooth roof which had been used with relatively small lights of glass in weaving sheds had not been applied to other kinds of factories in this country as far as known; but in Belgium a firearms plant, and in Paris an automobile factory, had been built with sawtooth roofs with successful results, and it was decided to use them for this printing plant. The entire working part of the factory was covered with a sawtooth roof with the glass surfaces 11 feet high facing north every 28 feet. The result was that the entire printing plant was almost as light as day. The press room was located in the center of the building and the activities of the plant revolved more or less in a circle around this press room and terminated in the stock or shipping room located next to the railroad tracks, as shown by the plan. As a part of the scheme for the building, it was decided to introduce some features which at that time were more or less novel in the printing business, at least. First were the long lavatories, absolutely sanitary, the locker rooms with individual lockers, the lunch rooms with hot coffee, the bicycle storage rooms for the help's wheels, the rest rooms, the library, the little hospital with its ready dressings and medicines, the recreation room with the piano and dancing floor, and, best of all, the little five-acre park in the front of the plant with its flowers and walks, its lily pond and recreation ground for the amusement and enjoyment of the employees. Recently the writer called on Mr. Conkey and asked him, "How about this park in front and all these things you have done for your people? After eighteen years' trial, can you say that it pays?" He replied, "If I were to do it all over again, I wouldn't change a thing, and I wouldn't omit a single thing that we

Arthur Colton Manufacturing Building, Detroit, Mich.
Mildner & Eisen, Architects

have done for our people; it has paid and paid big." Testimony of this kind might be gathered from the owners of many plants where things of this kind have been done, but it would be few of them who could date their experience back as far as Mr. Conkey, as eighteen years ago there was very little welfare work done among employees. They were left to shift for themselves. Now it is not at all uncommon and it shows a growing concern and regard for the welfare of employees by the owners.

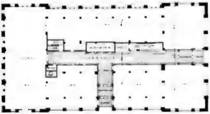
As an exception to the rule in a class of factories which have been proverbially bad in their lack of provisions for employees, the Havana-American Tobacco Company's plant in Chicago may be of interest. The employees of cigar factories are usually drawn from the poorest class of people, and the interior of these factories are about as dirty and unsanitary as any that can be found. The odor of the tobacco in the cigar-rolling rooms of all these factories has a peculiar effect on the workers. It is inclined to make them go to sleep, particularly where the ventilation is poor. In the South, in Cuba and Florida, the workers have an entertainer in each room who keeps them awake while they work by reciting or reading something to them, usually a tragedy of some kind which is delivered with all the emotion and fire of a genuine Shakespearian performance. In the Havana-American plant the workrooms were made light, airy, and sanitary. In fact, the workers operate under saw-tooth skylights with fine mechanical ventilation. They are provided with plain, well lighted, and sanitary lavatories, locker rooms, and lunch rooms with hot coffee. Cigar makers are paid on the piece basis, and in the old plant they seemed to come and go pretty much as they pleased under the rules of their union. The difficulty was to get them to work long enough in a day to produce the number of cigars desired. The interesting feature of the new plant, however, is that they do not want to go home when the closing hour comes. They are so much more comfortable at work in this new shop than they were accustomed to be, and so much more so than many of them would be at home, that they have to be turned out in the evening when it is necessary to close down the plant.

There are two great industrial plants at which this welfare work for employees has been developed to a higher state and carried on at a larger scale than in any other places in the country. These are the plants of Sears, Roebuck & Company of Chicago, Ill., and The National Cash Register Company of Dayton, Ohio. Sears, Roebuck & Company's plant occupies a site two blocks wide and half a mile long. A street runs the long way through the property, dividing it into two parts. The buildings occupy the ground largely on one side of this street, and the land on the opposite side is taken up by the gardens and recreation grounds. There are ten thousand employees to care for. Provisions are made for serving them all with lunch in the plant. There are cafeterias, lunch counters, and restaurants where anything from a sandwich to a porterhouse steak can be bought at a price intended to cover only the actual cost so that there is no incentive on the score of economy to take time from their recreation hour in going to or from home at noon. When the weather is fine, there is diversion outdoors to suit almost any taste. In the sunken garden opposite the Administration Building there is a pond and pleasant walks and paths along which some of the best flowers of the different seasons are kept in bloom. There are greenhouses in another part of the grounds. Next to the garden is the athletic field where they had an audience of twenty thousand people at their last Annual Field Day. The field contains a regulation baseball diamond, a running track and grounds for various other outdoor sports, together with separate field houses for men and women with lockers, shower baths, and the usual equipment. Next to the athletic field are the tennis grounds containing thirteen of the finest kind of tennis courts — tennis and baseball being the favorite outdoor sports. At the other end of the grounds is the Sears, Roebuck & Company Department Y. M. C. A. Building, where there is a large gymnasium with running track in the gallery and all the modern apparatus in addition to a regulation swimming tank, bowling alleys, billiard rooms, etc. In the interior of the various buildings almost everything that could be devised has been furnished for the safety, health, comfort, and convenience of employees. They used to keep statistics on "headaches" and other ailments that occur to employees, and they found a surprising diminution of all these things after they moved from the old buildings into the new ones where modern ventilation, lighting, and good food at lunches were provided. There is a fully equipped hospital department done in white tile and sanitary materials in charge of a regular practising physician, nurses, and a dentist where a lot of good work is done continually. There are rest rooms, a library, and now plans are being considered for a banquet hall and place for holding large meetings. The employees are urged to save their money and at convenient places there are United States mail boxes into which they can drop their pass-books and savings. In connection with this there is a regular savings bank with receiving clerk, paying teller, and the other officers where they can transact almost any kind of banking business.

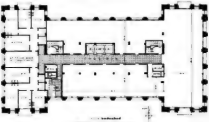
The National Cash Register Company of Dayton, Ohio, has, almost since its inception carried on a most praiseworthy welfare work among its employees. It is an immense plant, consisting of substantial and attractive buildings located in beautiful grounds. Almost everything which modern science and skill could do for the health and comfort of the employees in its plant has been done. It was not only done at first as the result of a kindly impulse, but it is a sincere and permanent policy of the firm which has resulted in keeping this work up with the development of the plant. The most striking thing perhaps which the firm has done for its people is the manner in which they have encouraged them to own their own homes and to beautify them with flowers and gardens. Certainly the city of Dayton ought to, and probably does, appreciate the great benefit of this plant to the city.

In conclusion the writer wishes to call particular attention to the work of other architects which has been very kindly contributed for illustration in this article. It is representative of present work in the Middle West and shows beyond doubt a wonderful improvement over what was formerly done. It clearly indicates that an earnest movement has been started in this locality to improve and perfect the architecture of factory and industrial buildings, and it illustrates well many of the arguments for which the writer has contended in this article.

PRINTING HOUSE OF R. R. DONNELLEY & SONS COMPANY, CHICAGO, ILL.
HOWARD SHAW, ARCHITECT



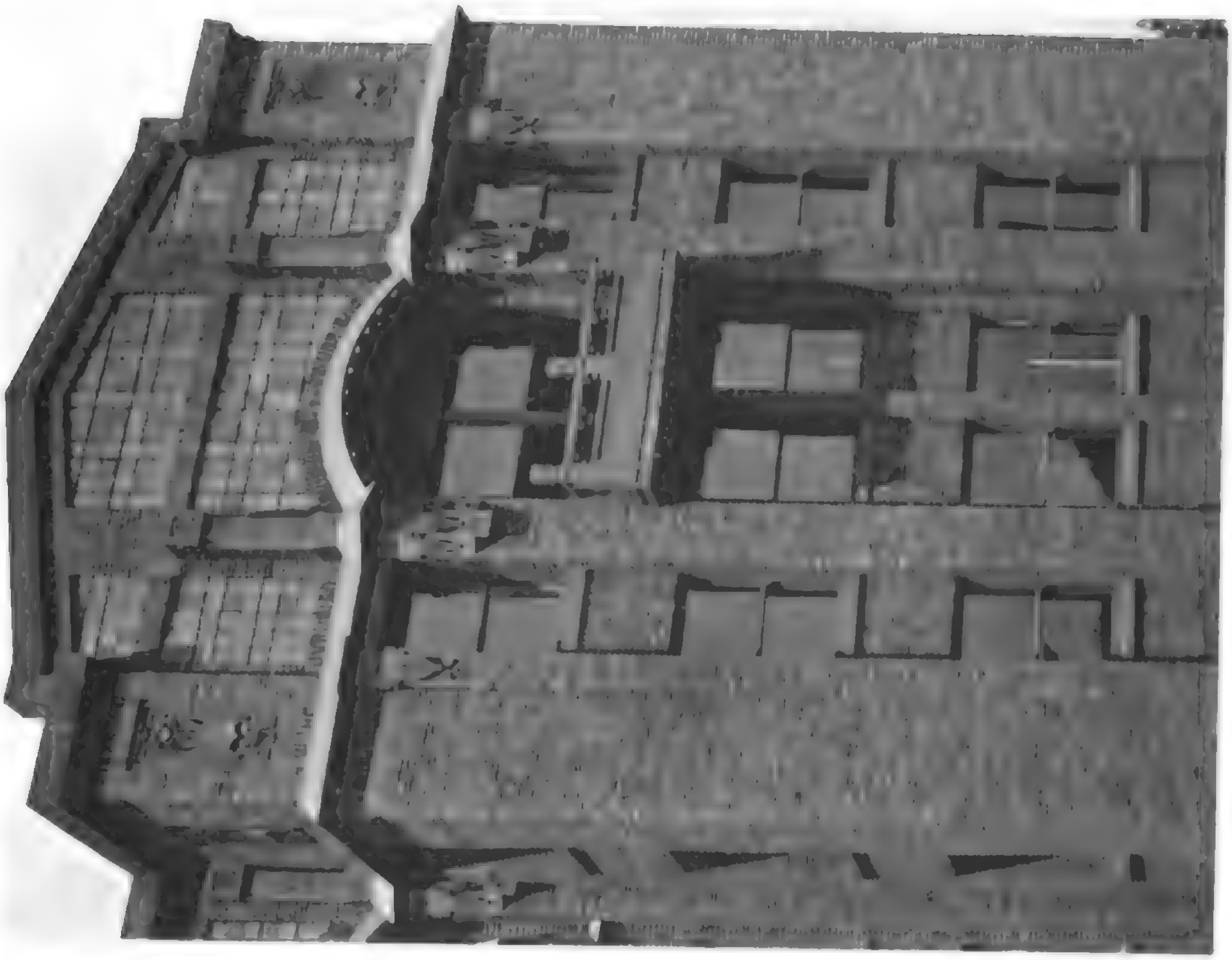
FIRST FLOOR PLAN



SIXTH FLOOR PLAN

FARMERS' TRUST COMPANY BUILDING, SOUTH BEND, IND.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS

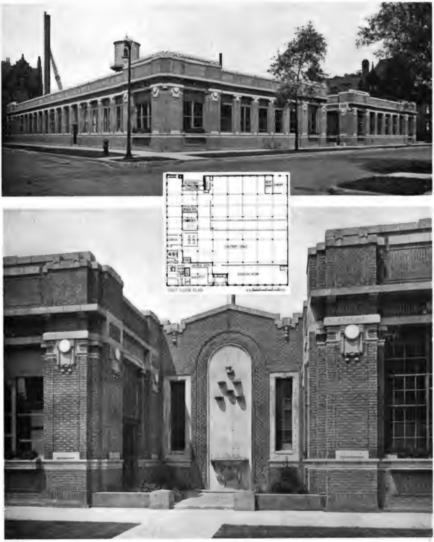


DETAIL OF UPPER STORIES OF END PAVILIONS

DETAIL OF LOWER STORIES OF END PAVILIONS

FARMERS' TRUST COMPANY BUILDING, SOUTH BEND, IND.

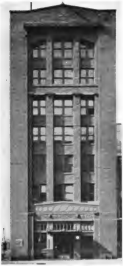
PERKINS, FELLOWS & HAMILTON, ARCHITECTS



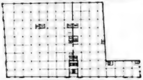
DETAIL OF ENTRANCE COURT

THE HUMP HAIRPIN MANUFACTURING COMPANY BUILDING, CHICAGO, ILL.
A. S. ALSCHULER, ARCHITECT

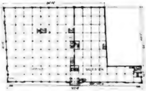
GENERAL VIEW FROM CHICAGO RIVER



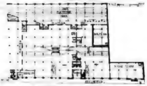
DETAIL OF CLARK STREET WING



TYPICAL FLOOR PLAN



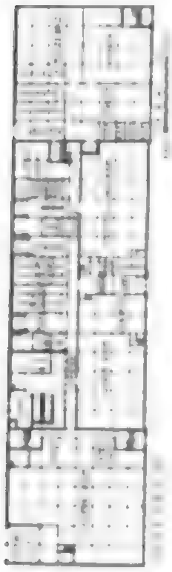
FIRST FLOOR PLAN



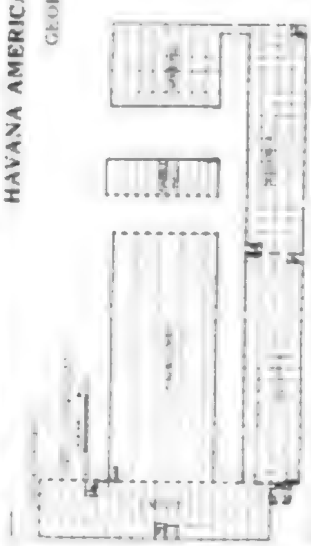
BASEMENT FLOOR PLAN

DETAIL OF TOWER

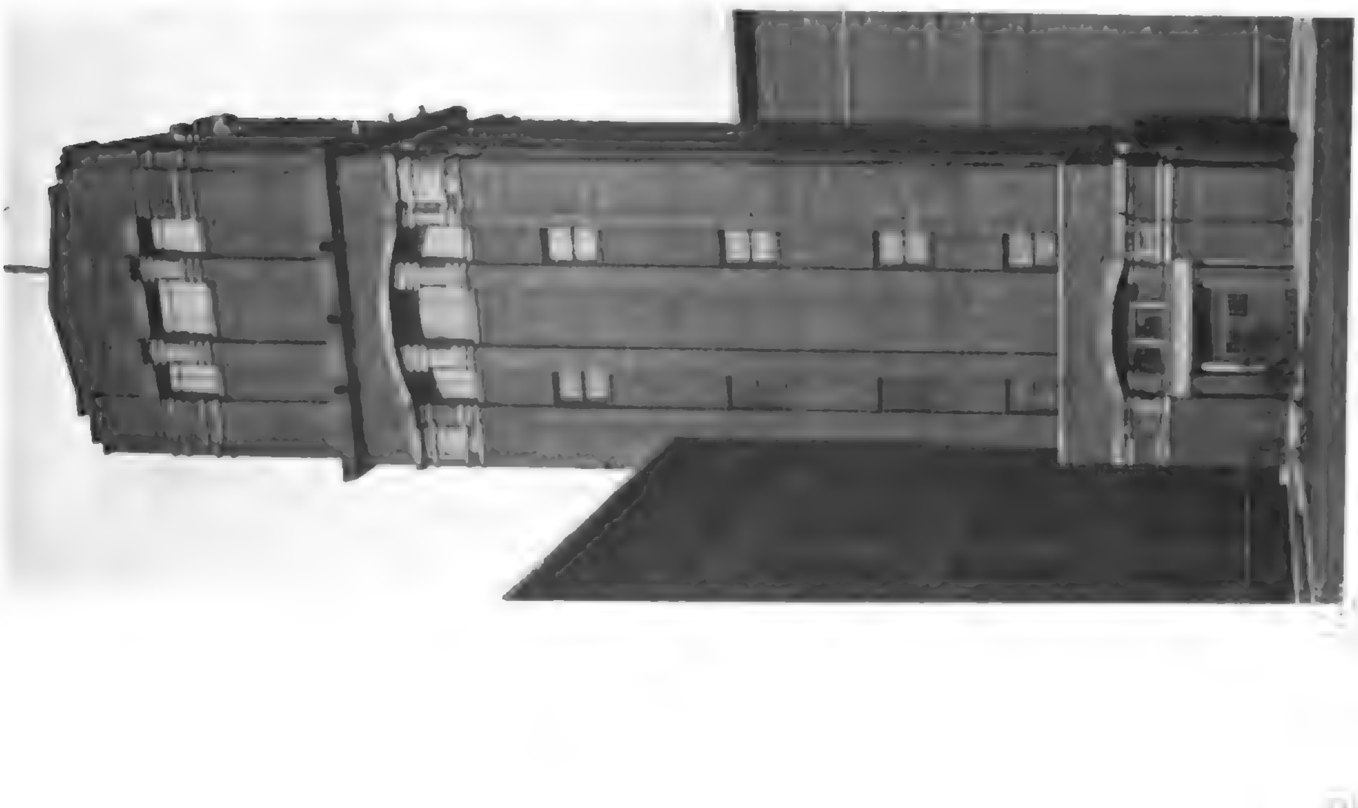
REID, MURDOCK & COMPANY WAREHOUSE, CHICAGO, ILL.
GEORGE C. NIMMONS, ARCHITECT



HAVANA AMERICAN COMPANY BUILDING, CHICAGO, ILL.
GEORGE C. NIMMONS, ARCHITECT

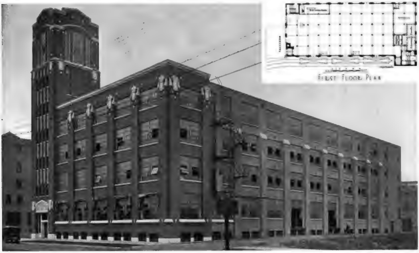


GENERAL VIEW OF PLANT LOOKING TOWARD SECTION C



VIEW OF TOWER

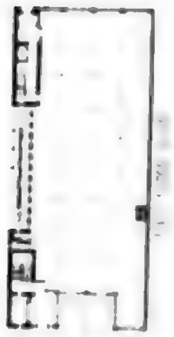
LIQUID CARBONIC COMPANY PLANT, CHICAGO, ILL.
NIMMONS & FELLOWS, ARCHITECTS



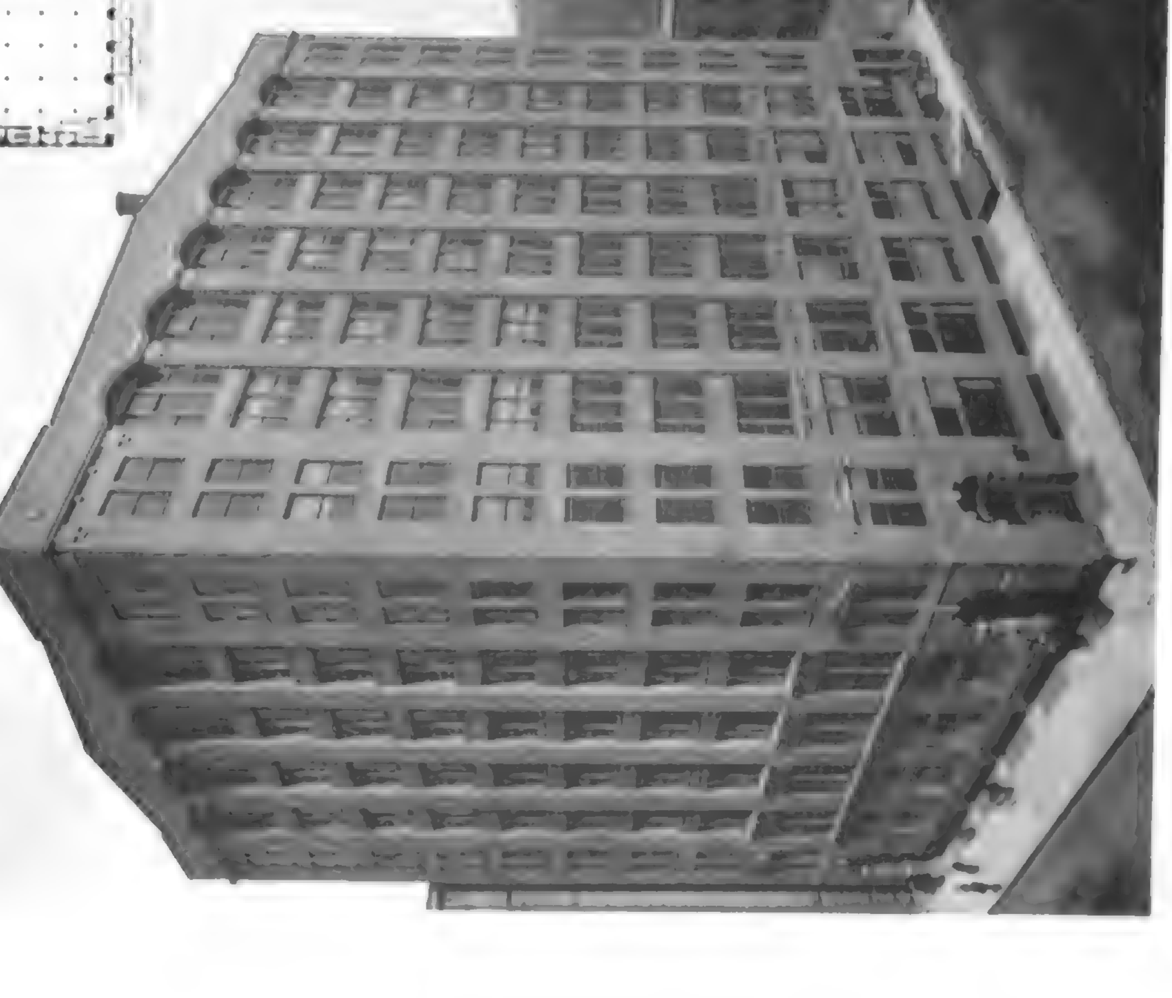
CENTRAL BAG MANUFACTURING COMPANY BUILDING, CHICAGO, ILL.
S. SCOTT JOY, ARCHITECT

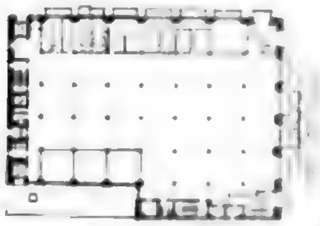
VIEW OF UNIT FRONTING ON WESTERN AVENUE

MIDLAND WAREHOUSE, CHICAGO, ILL.
S. SCOTT JOY, ARCHITECT



TULANE BUILDING, CHICAGO, ILL.
POND & POND, ARCHITECTS



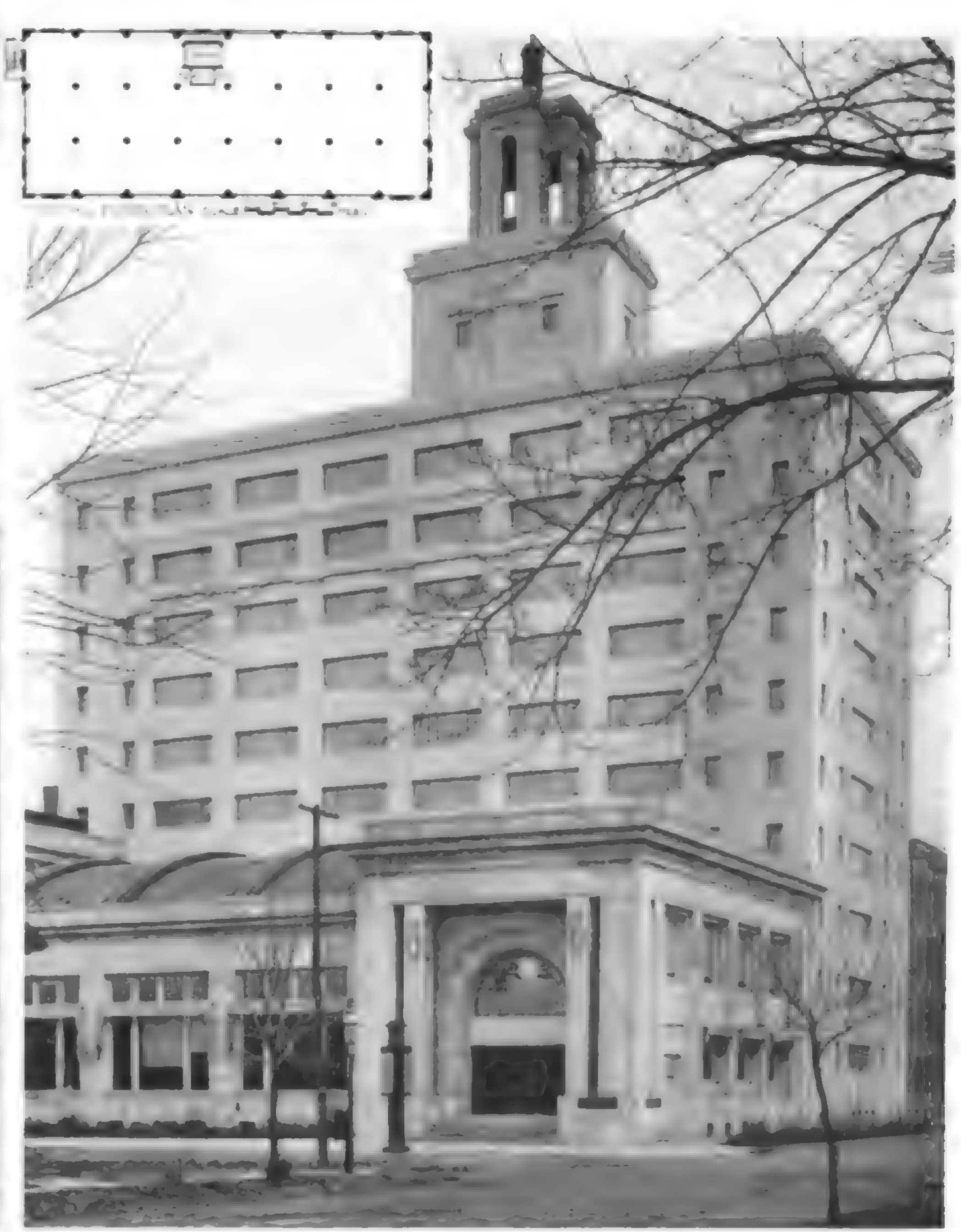


KENT BUILDING, CHICAGO, ILL.
POND & POND, ARCHITECTS

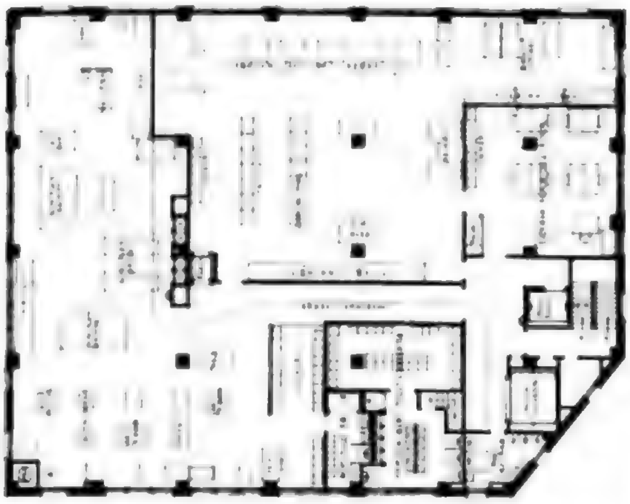
FACTORY BUILDING OF M. T. SILVER & CO. AND THE SUNSHINE CLOAK & SUIT CO., CLEVELAND, OHIO
J. MILTON DYER, ARCHITECT

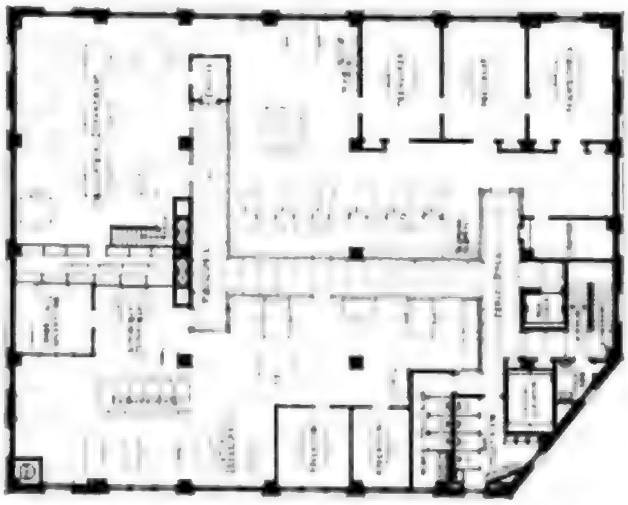
WAREHOUSE OF THE W. BINGHAM COMPANY, CLEVELAND, OHIO
WALKER & WEEKS, ARCHITECTS

HIDE HOUSE OF A. F. GALLUN & SONS, MILWAUKEE, WIS.
BRUST & PHILIPP, ARCHITECTS

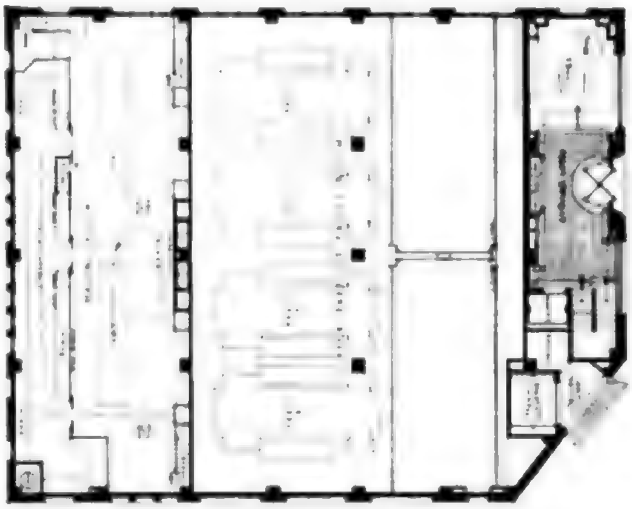


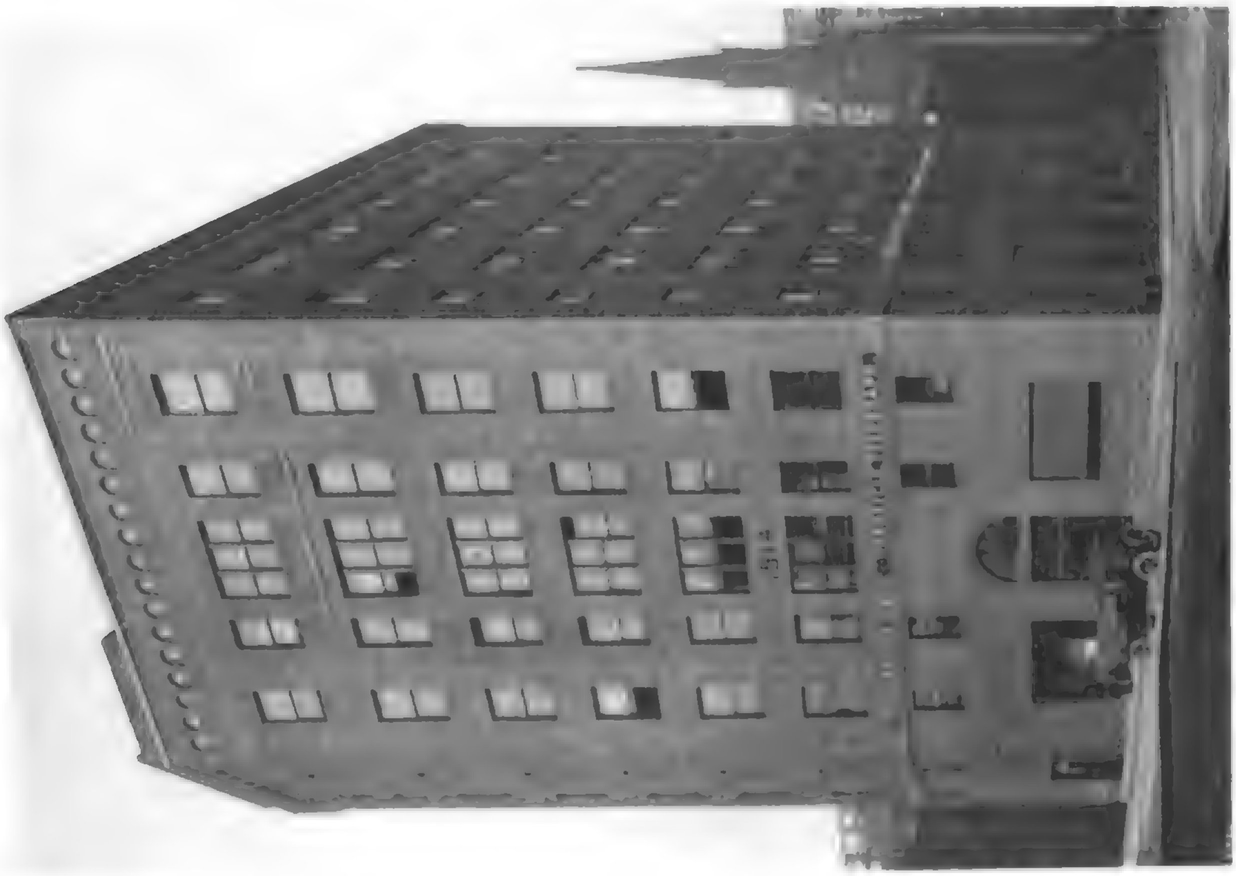
WAREHOUSE OF THE J. R. WATKINS MEDICAL COMPANY, WINONA, MINN.
GEORGE MAHER, ARCHITECT


SEVENTH FLOOR PLAN


THIRD FLOOR PLAN

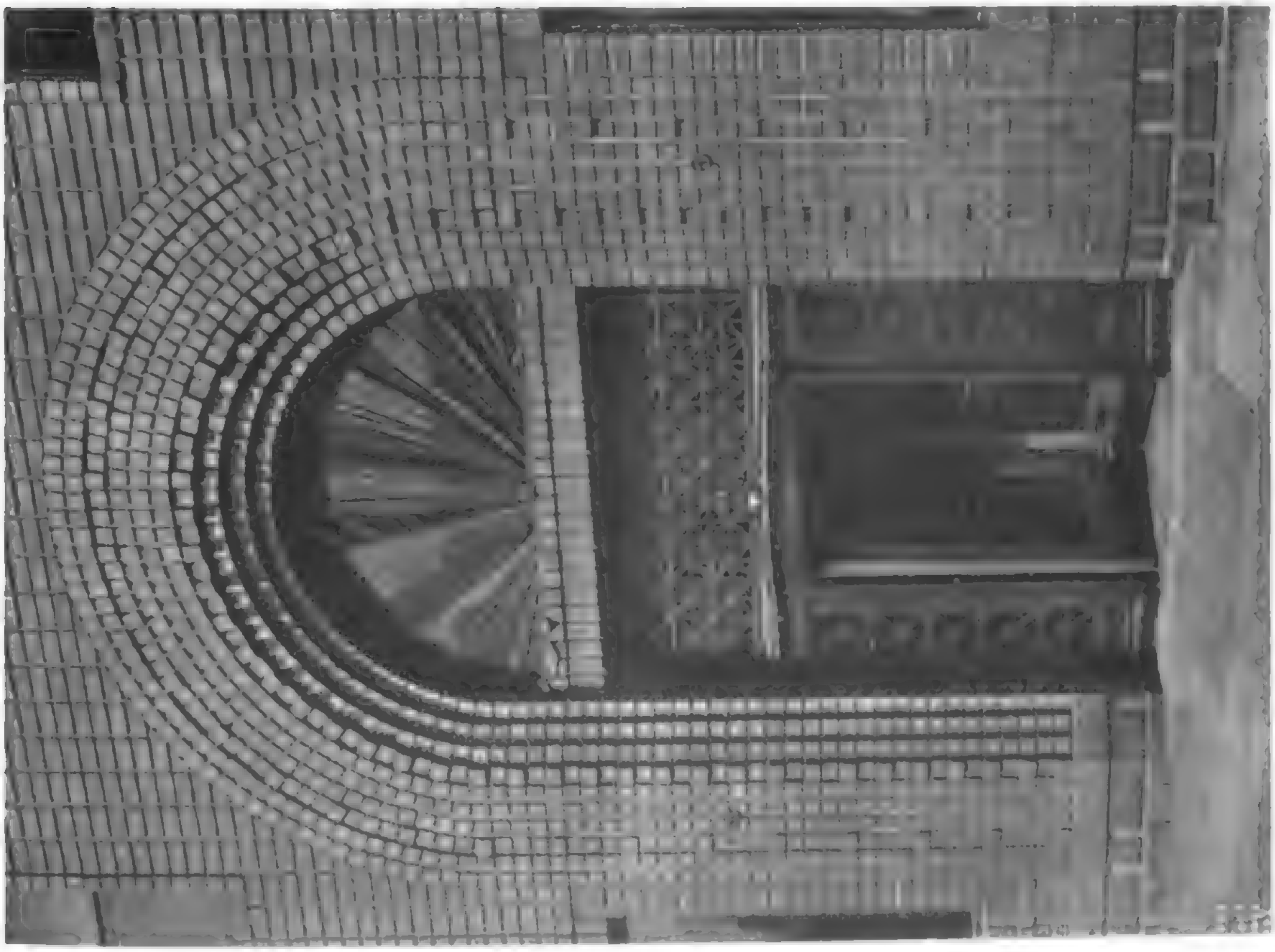

FIFTH FLOOR PLAN


FIRST FLOOR PLAN


GENERAL VIEW OF EXTERIOR

THE GAZETTE-TELEGRAPH BUILDING, PITTSBURGH, PA.

EDWARD B. LEE AND JAMES P. PIPER, ASSOCIATED ARCHITECTS



DETAIL OF MAIN ENTRANCE

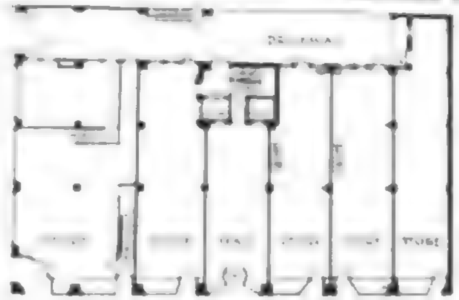
DETAIL OF UPPER STORIES AND CORNICE

THE GAZETTE-TELEGRAPH BUILDING, PITTSBURGH, PA.

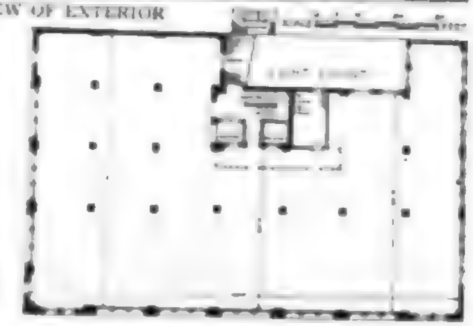
EDWARD B. LEE AND JAMES P. PIPER, ASSOCIATED ARCHITECTS

DETAIL OF LOWER STORIES

GENERAL VIEW OF EXTERIOR



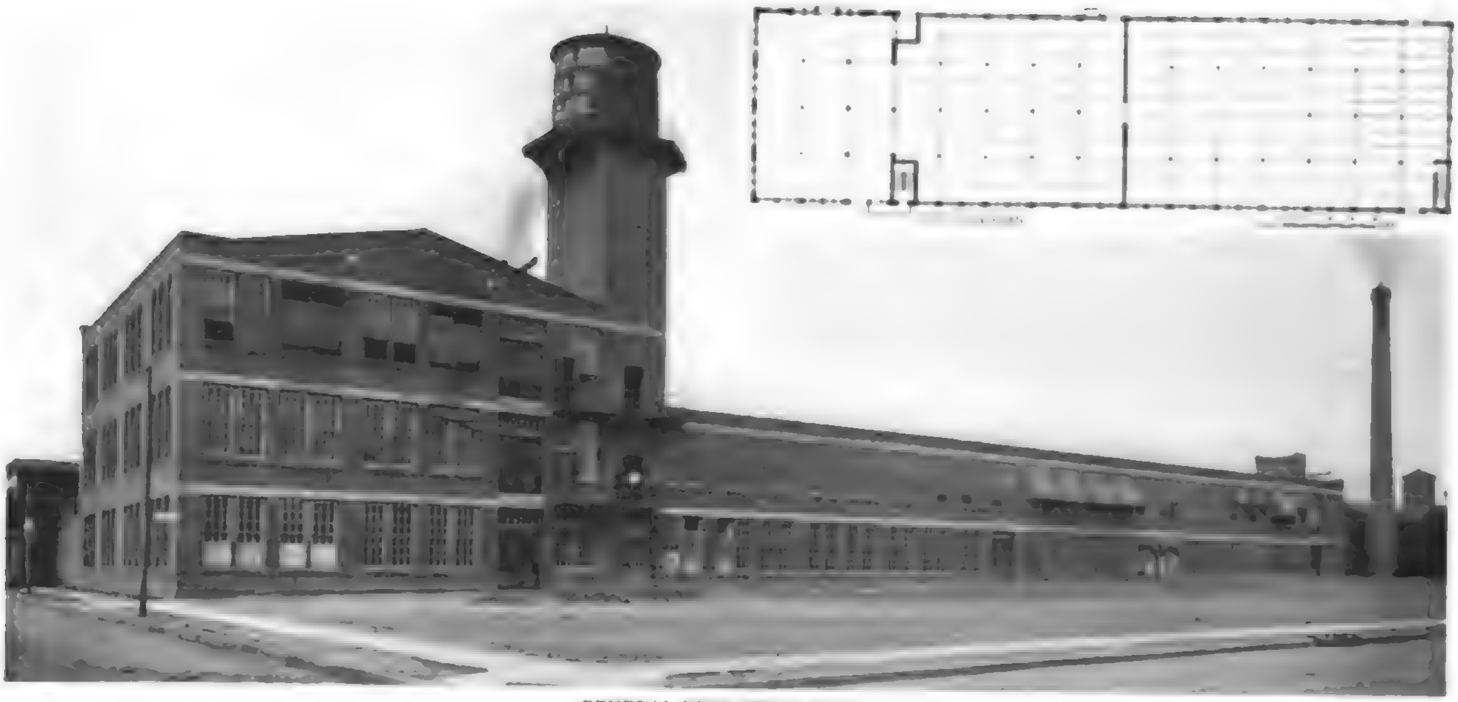
FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

THE JOURNAL-COURIER BUILDING, NEW HAVEN, CONN.

MURPHY & DANA, ARCHITECTS



GENERAL VIEW FROM REAR

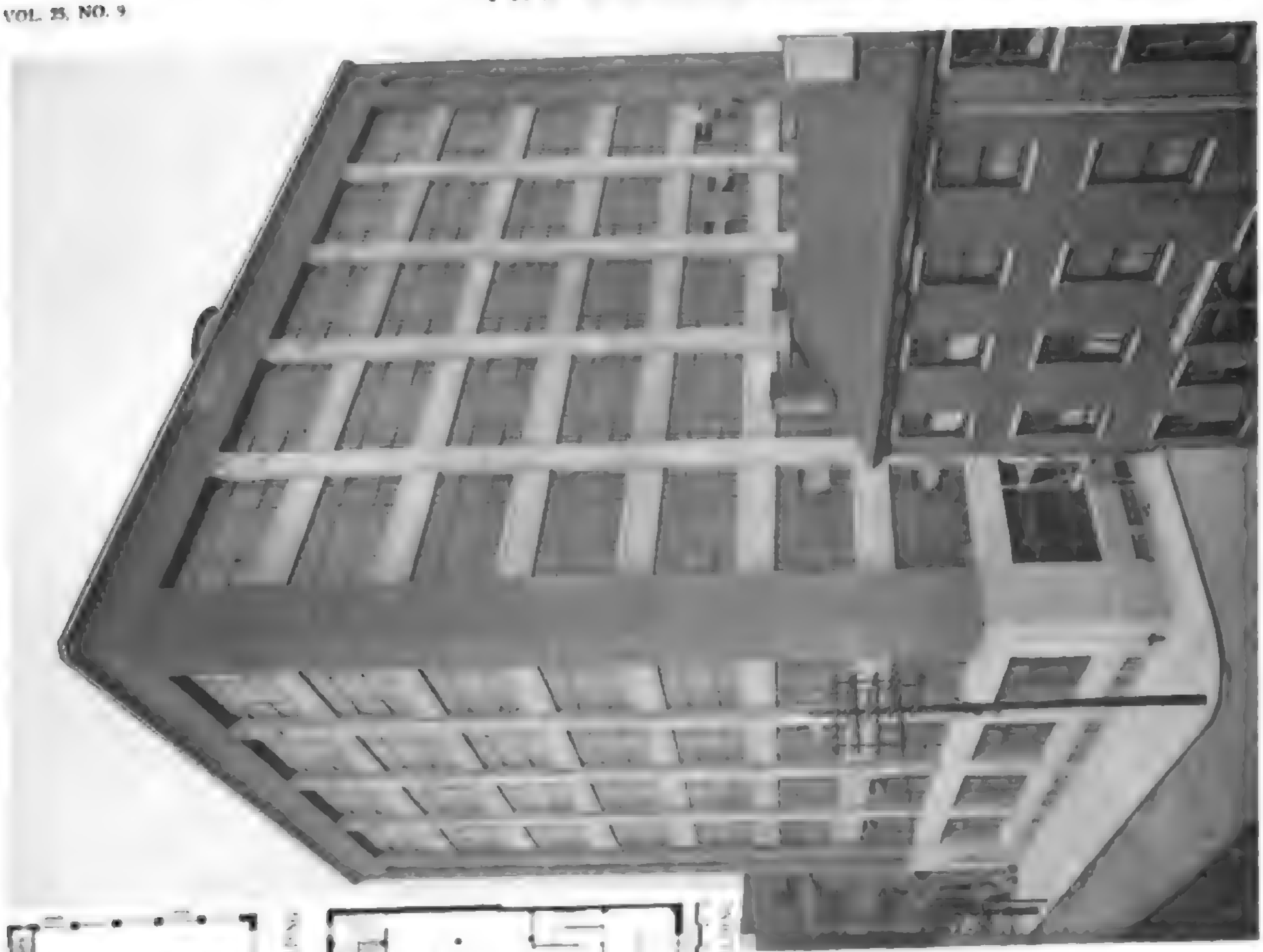
VIEW OF PRINCIPAL FACADE

FACTORY BUILDING OF BLUMENTHAL BROS., FRANKFORD, PHILADELPHIA, PA.

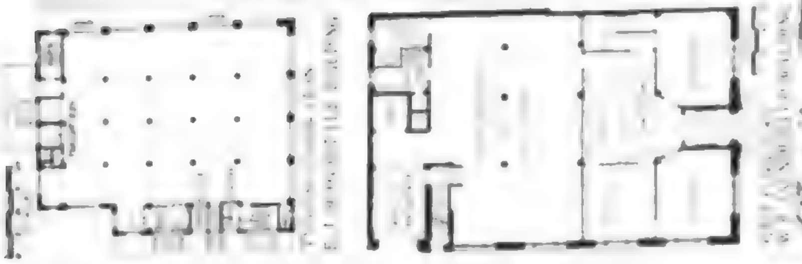
STEARNS & CASTOR, ARCHITECTS

PIERCE-ARROW SERVICE BUILDING, LONG ISLAND CITY, N. Y.
GRIFFIN & WYNKOOP, ARCHITECTS

WAREHOUSE OF THE C. A. GAMBRILL MANUFACTURING COMPANY, BALTIMORE, MD.
PARKER, THOMAS & RICE, ARCHITECTS



EDWIN J. SCHOETTLE COMPANY BUILDING, PHILADELPHIA, PA.
DAY & KLAUDER, ARCHITECTS



W. B. SAUNDERS COMPANY BUILDING, PHILADELPHIA, PA.
JOHN T. WINDRIM, ARCHITECT

The Modern Manufacturing Building.

ITS DEVELOPMENT AS REPRESENTED IN RECENT STRUCTURES IN THE EASTERN STATES.

By JOHN J. KLABER.

THE factories built in recent years in the United States are very different from those of fifteen or twenty years ago. Then almost any structure with four walls and a roof was usually considered adequate for factory use; now, on the contrary, it is becoming generally recognized that the building of a factory is as deserving of study as that of a church or a residence.

The problem is, of course, very different from that presented by most other types of building. Early factory buildings followed closely the prevailing forms of private dwellings, with small windows, complicated planning, and inappropriate types of ornamentation, and it is only within the last few years that the true requirements of the problem have come to be at all generally understood.

The purpose of a factory building is, essentially, to conduce in every way to the most profitable manufacture of some article, be it shoes, electric lamps, or baby carriages. This point must never be lost from view in the preparation of the design, and everything else must be subordinated to it. But this does not mean that there must be nothing in a factory but the bare essentials of manufacturing. Other elements, of a more personal nature, may well enter, in so far as they are of value, either directly or indirectly, to the essential purposes of the building.

For this reason an interesting architectural treatment, provided it does not involve undue expense, is of great psychological value. The providing of pleasant and cheerful surroundings for the workman has been found to increase his output by stimulating him mentally to a higher degree of interest in the work in hand, and is therefore an excellent investment, even considered from a strictly selfish standpoint. And, apart from this, it is hard to understand why any manufacturer should refuse himself the personal gratification of owning a handsome building rather than a sordid and uninteresting one, particularly when, as is usually the case, the difference in cost is relatively small.

Nevertheless, one still finds that the majority of factories are constructed without any serious or intelligent effort at good design, and even where this has been attempted it has often been unsuccessful, because the designer has proceeded along lines fitted only to other classes of building. The better buildings, however, are often of great merit, and their example should be of value to others who have occasion to design similar structures.

It is in the Middle West, and particularly in such cities as Chicago and Detroit, that the most striking progress has been made. This is easily understood, in view of the more rapid growth of this section and its less degree of dependence on traditional types of design. But in the East, also, many excellent factories have been erected in the past few years.

The principal types of building that are used for manufacturing have become fairly well differentiated and may be divided, generally speaking, into three groups — the machine shop, the weaving shed, and the loft building. The last named is by far the most generally used and is that in which, architecturally speaking, the most interesting factory work has been accomplished. There are also various special forms of buildings, including power houses, coal bunkers, and the like; but there are few of any architectural interest, for these types have received even less attention from the architect than the factory.

Planning. The machine-shop and weaving-shed types of factory, both one story in height, have usually been constructed only where land was of small value, and have, in consequence, been generally of the baldest and most

Otis Elevator Company Plant, Buffalo, N. Y.
Green & Wicks, Architects

utilitarian character. Their plans have, in general, been designed by engineers rather than architects, and based almost wholly on structural considerations. The necessity, in machine shops, for the use of traveling cranes to transport heavy machinery has produced an arrangement of wide bays that is familiar to all, but that has seldom received any architectural treatment, the structural forms being left in their most primitive and unadorned state.

The weaving-shed type is equally utilitarian, being used not only in textile mills, for which it was originated, but in various other types of manufacturing. The two types are frequently used in conjunction with each other and with other buildings several stories in height, the height tending to increase with the cost of the ground.

It is only in the multi-story or loft-building type that the plan becomes a matter of architectural interest. Here it is no longer a question of erecting sheds composed of simple posts and trusses, designed by an engineer, for in the loft building problems arise with which the engineer is altogether unfamiliar, and which only an architect is accustomed to solving.

Hudson Companies Power House, Jersey City, N. J.
Robins & Oakman, Architects

The greatest and most frequent error is that of covering too great a percentage of the area of the lot, particularly in more or less congested cities. This inevitably results in defective lighting, with consequent poor workmanship and large bills for electric light, and often causes the abandonment of the building after a short period of occupancy. In New York City the losses to investors from this form of misguided enterprise have been enormous, and yet the same mistake continues to be made in new developments, each individual owner trying to put upon his neighbors the burden of providing the necessary open spaces. Where a single owner — individual or corporation — develops a large area at one time, this mistake is less likely to occur ; but in smaller buildings it seems that there is no way of preventing it except by drastic legal methods, and these are gradually being introduced in many cities.

Natural light from a fairly clear sky will seldom penetrate into a building more than 30 or 40 feet with sufficient strength for manufacturing purposes, although the use of diffusing glass — prisms or factory ribbed — is an aid in this matter. Sixty feet, where the light comes from both sides, may be taken as an average width for maximum effectiveness, with the ordinary 12 to 14 foot ceilings, though in congested sections this is often exceeded, the less lighted parts being used for storage, circulation, or other suitable purposes.

The plans of typical factories show, in different degrees, this conflict between the necessity for adequate lighting and the desire for the maximum utilization of the available space. In many cases the ground floor almost completely covers the lot, the central portion having top light only, while in the upper stories courts have been left between the wings of the building. The arrangement of the Pierce-Arrow Building is somewhat special in that only the front part of the structure has as yet been carried to its full height, the wings being left for future development. This gives unusually good light for the time being, but when the building is complete, the lighting will be somewhat less excellent, though still far superior to ordinary standards.

The Auerbach Candy Factory shows unusually wide floors, exceeding 100 feet. This, no doubt, is due to the nature of the industry, enabling a large part of the space to be used for purposes requiring little natural light.

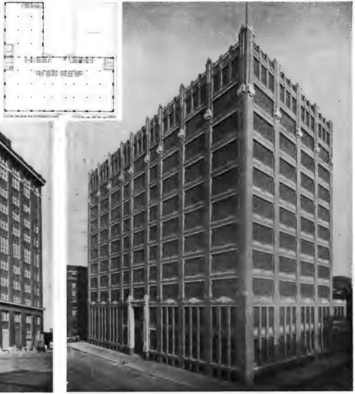
While it is evident from these examples that certain industries require more abundant light than others, there can be no doubt that in the vast majority of our factories the floor widths are excessive and that the output suffers in consequence. This is particularly true of the commercial loft building or tenant factory, a type that is becoming more and more general in the manufacturing districts of large cities.

The internal arrangement is, in general, determined by economical column spacing, since the partitions usually carry no weight, being merely removable divisions of light construction, adopted as a matter of convenience and capable of being shifted about as the development of the business may require. For the usual fireproof construction, with average loads, a spacing of columns from 16 to 25 feet on centers is ordinarily the most economical, and such a spacing has practically become the standard for the best practice. There are, however, many exceptions to this rule, as in the Pierce-Arrow Building, where the exceptionally wide spacing of 30 feet has been used in order to accommodate large automobile trucks. But this wide spacing has necessitated the use of very heavy girders and would not be advisable except in a special case of this nature.

Where the floor areas are very large, they are often divided by fire walls, and although this hampers superintendence to some extent, it is a valuable measure from the standpoint of fire protection. Where such fire walls are used, all openings in them must of course be protected by adequate self-closing fire doors, otherwise their entire value disappears. These details, however, are usually controlled by law, the practice varying in different cities and states; and in the absence of local regulations the rules of the insurance underwriters may be taken as standard.

The planning and location of stairs and elevators are

NATIONAL BISCUIT CO. FACTORY, NEW YORK, N. Y.
A. G. ZIMMERMANN, ARCHITECT



AUERBACH CANDY FACTORY, NEW YORK, N. Y.
ROBERT D. KOHN, ARCHITECT

among the most difficult problems in buildings of this type. They should be located so as to be convenient to all parts of the building, and at the same time to interfere as little as possible with lighting, and to form the least possible obstruction to floor space. The solution of this problem must be determined specially for each individual case, depending on the requirements of the building and the shape of the ground. The location of stairs and elevators along party walls, where these exist, is a natural and obvious solution and one that is generally adopted. Where, however, the floor areas are very large, additional means of exit must be introduced, their location varying according to individual conditions.

The size of elevators depends mainly on the bulk of the materials to be handled and the number of employees to be cared for, and may be determined for passenger elevators by rules similar to those currently used for office buildings. The stairs, on the other hand, are usually fixed by law, being required as fire exits. The New York State Factory Law, for instance, requires that all stairways in factories erected after the passage of the law shall be at least 44 inches in clear width, with treads of at least 10 inches and risers not over 7¾ inches. Winders in stairs are prohibited, the stairs must be entirely enclosed in fireproof partitions for their full height, and must, in general, be continuous from the roof of the building to the street. They must also be proportioned to the floor area and to the number of employees, so that their planning is a matter requiring the greatest care.

For the support of overhead shafting the usual method is to install inserts in the underside of the floor slabs, spacing them from 18 inches to 2 feet or more on centers. To these inserts the shafting hangers are bolted. In other cases the hangers are bolted to wood strips, which are similarly fastened to the under side of the concrete beams, as in the Pierce-Arrow Building.

In another building a very ingenious and unusual device for supporting shafting has been used. Grooves have been cast in the sides of the concrete beams and girders, so as to allow the suspension of hangers at any point, by means of hooks clamping around the lower flange of the beams.

Fire Protection. Even when the building itself is of fireproof construction, its contents and fittings are often of an inflammable nature. For this reason precautions must be taken to protect the contents against the spread of fire, since insurance, while it may repay actual material loss, can never make up for the loss of time and good will caused by any serious interruption of an industry.

It has therefore been generally accepted as good practice that all openings should be protected as fully as possible. Windows in modern factories are almost universally provided with steel sash, which avoid the fire risk of wood sash at practically the same cost; and where wire glass is used, as is very generally the case, this protection may be considered almost perfect.

Doors are also made of metal or of metal covered wood, with wire glass panels where necessary. The doors leading to stairs are of particular importance in this respect. It is generally accepted that these doors should open outward, but it often happens that they swing into the passage, so that the crowd from upper floors prevents the opening of the door on the floors below. The fire towers of the Auerbach Candy Factory show an arrangement by which this danger is avoided by enlarging the stair landings at this point — a device worthy of more general adoption.

Elevator doors are usually made to slide and are as substantially built as is possible without undue expense. It is important that they should close their openings completely so as to prevent the spread of fire from one floor to another.

In addition to the above measures, automatic sprinklers are usually installed where complete protection is desired. These greatly lower the insurance rates, the reduction being enough to pay for their installation in a very few years. The pipes, in factory buildings, are suspended from the ceilings, no attempt being made to conceal them, as is often done in office buildings and stores.

The layout of sprinkler pipes must of course be arranged to fit the spacing of the ceiling beams, which varies considerably in different examples, but it should be as simple as possible while allowing a sufficient number of automatic heads. A floor area of 80 to 100 square feet per head is generally accepted as standard practice.

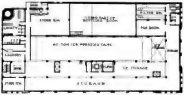
Where the buildings are heated, the pipes are kept constantly filled with water; but where there is danger of freezing, the dry pipe system is employed. Here the pipes are filled with air under pressure, so that the melting of one of the heads allows this air to escape and admits water to the pipes. When properly installed, an automatic sprinkler system is undoubtedly the most efficient fire protection, as it puts out the fire before it has time to become a serious danger. In some cases, however, goods have been seriously damaged by water from sprinklers, and there may be some types of industry where the damage from water would be so much greater than that from fire that their installation would be inadvisable.

Heating. Steam heat is generally employed in factory buildings, the exhaust steam from the power plant being the ordinary source of heat, so that the cost of heating is almost nothing. Where power is taken from the outside, a separate heating system must be installed, and the expense is accordingly greater, although the low cost of electric power service, in some localities, may make this arrangement more profitable. Ordinary radiators or pipe coils are used, depending on the available wall space, and where the floor area is large, additional radiators are hung on the interior columns. Pipes are also run around the skylights to prevent condensation and keep them clear of snow.

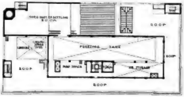
Architectural Treatment. It is only within recent years that the necessity of any architectural treatment for industrial buildings has begun to be recognized in America, and even now this recognition is far from general. In this matter we are less advanced than some of the countries of Europe, where artistic factory design is comparatively common. Nevertheless, we can show some examples of good design, though most of them are characterized by careful study rather than by originality of conception.

The materials used in factories lend themselves readily to certain types of decorative treatment, with an expense that is trifling, relatively to the total cost of the building. Concrete is, without a doubt, the most intractable of these materials. Used alone, it is difficult to obtain a pleasing

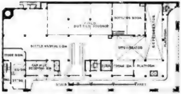
GENERAL VIEW OF EXTERIOR



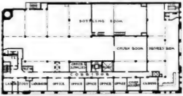
THIRD FLOOR PLAN



FOURTH FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

DAIRY BUILDING OF THE SHEFFIELD FARMS, SLAWSON-DECKER CO., NEW YORK, N. Y.

FRANK A. ROOKE, ARCHITECT

texture or a satisfactory color. In combination with other materials, however, its possibilities are far greater. The Schoettles Building is an excellent example of its use, in combination with brickwork, the two materials being used in such a manner as to produce a decorative effect by emphasizing the constructive elements of the building.

The Sheffield Farms Building is an example of a front built almost entirely of white glazed terra cotta, adopted in this case to carry out the idea of the nature of the industry, the building being used for the handling of milk and other dairy products. The use of cows' heads and milk bottles as ornamental motives further emphasizes the same idea.

One of the most difficult problems that the architect constantly meets is the treatment of the necessary sprinkler tank. This is often, indeed more often than not, left in its natural stark ugliness to injure an otherwise good design. Sometimes, however, the architect has been able to persuade the owner to let him enclose the tank with a tower, usually the top of an elevator bulkhead, so as to harmonize it with the general lines of the building. An excellent example is the factory structure of the American Bank Note Company, which is notable for its economy of means and for its excellent study of proportion. The tower is obviously inspired from medieval Italian examples; but the adaptation has retained only a suggestion of them, and is by no means archeological in design.

Gothic details have been used in some modern factories, as, for instance, in the Pierce-Arrow Building. While this detail is well studied and interesting because of the manner in which the company's trade-mark has been worked into a decorative motive, the principal merit of the building, in actual execution, is the color and pattern of the brickwork, which give it great distinctiveness.

The Auerbach Candy Factory, while its general lines suggest a Gothic inspiration, by the emphasis of the verticals — a most appropriate treatment for a steel framed structure — is carried out with details that are altogether modern. While details of this nature are more or less common in the Middle West, in the Eastern States they are extremely rare, more traditional types being used.

The Blumenthal Brothers' Factory presents a treatment differing from the others herewith illustrated, because of its less height — only two stories — and greater degree of decorative elaboration. Some of the motives used on the front are plainly inspired from the Italian Romanesque, while others suggest a more classical origin. The entire building, however, is most pleasing in effect, and some of the details are of considerable interest, particularly the door of the power house, where an ornamental effect has been obtained by the simplest means, through a combination of brick, tile, and cement, with a single spot of marble. The Blumenthal Factory is also interesting for its treatment of a gabled roof — a feature that is more or less unusual in modern factory design.

The interiors of most factories are of little artistic interest. Except for the offices, there is seldom any effort to produce anything more than is demanded by necessities of construction. Some Western examples show attempts at simple and inexpensive decorative schemes, chiefly by means of stenciled patterns; but in the East this is almost unknown, although, in view of the very great improvement to be obtained at slight cost, the attempt would seem well worth making, particularly for the lighter types of manufacturing. It is to be hoped that attempts of this nature will become more common in the next few years, as the need for agreeable surroundings in working places becomes more generally felt.

American Bank Note Company Factory, New York, N. Y.
John J. Petit, Architect

MORGAN & WRIGHT MACHINE SHOP, DETROIT, MICH.
ALBERT KAHN, ARCHITECT: ERNEST WILBY, ASSOCIATE

IRON FOUNDRY BUILDING, CHICAGO, ILL.
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

GENERAL VIEW OF EXTERIOR

INTERIOR VIEW OF MAIN MOULDING SHOP

THIS building is one-half of a complete unit which will be 800 feet long and 415 feet wide. The design of the facade expresses the structural principle of the building, for in contour it follows the form of the roof and wall trusses which are so designed that a continuous glass area is had from wall to wall in the sides of the lantern. The double line of columns beneath the central bay makes provision for a traveling crane.

MALLEABLE IRON FOUNDRY BUILDING, GENERAL ELECTRIC WORKS, ERIE, PA.

HARRIS & RICHARDS, ARCHITECTS

Natural Lighting of Manufacturing Buildings.

By O. M. BECKER.

NEXT to the selection of the site — with which the architect commonly has little if anything to do — and the determination of the type of building required by the location and nature of the productive processes therein to be carried on — with which the architect should have much to do — perhaps the most important single element in the design of industrial buildings is the provision for good lighting. The almost universal past indifference to the value of good and sufficient light, both directly in larger output and better product, and indirectly in better health and increased *morale* of the workers, only emphasizes the important duty of architects charged with industrial designing in this respect.

Effective Side Lighting

Wrought steel sash permits maximum strength for large openings with minimum obstruction. Movable sash may be designed to operate in any convenient way desired. This building, used in the manufacture of a food product, will bear studying for other features also.

The modern factory plant is not merely a shelter for workers, tools, and materials; it is itself a tool. Not infrequently it is a greater factor in production efficiency than the machines or tools which it houses. Certain it is that dark, ill lighted work rooms are not only unhealthful for the workers in them, but are pretty sure to be dirty, ill kept, slovenly, and that the workers in greater or less degree become the same. Well lighted shops, on the other hand, unquestionably make for good health, relieve eye strain, tone up a working corps, ensure a better product with less waste, and reduce the accident hazard. Inasmuch as window area is usually less expensive than blank wall, certainly no more so with single glazing, it would appear that the only consideration that could be urged in ordinary work rooms, in limiting the lighting area, is that of loss of heat during the winter months. While there is some ground for this, it in no wise compares with the advantages already cited.

It may be stated as a general proposition that all the wall area of a work-room building not essential as support for the structure should be given over to window openings. Wood-frame buildings can scarcely be considered for industrial purposes. Next to these the mill-construction building with brick walls permits of the least window area. The modern steel-frame or reinforced concrete-frame building with brick or concrete curtain walls is not only the most desirable industrial building, generally speaking, but permits and makes convenient the largest use of glazing.

In some instances architects appear to have gone almost to excess in this matter, the result being literally houses of glass built around steel frameworks. If kept reasonably clean, such buildings would approximate outdoor daylight conditions and would be desirable for some kinds of production activities perhaps. Allowed to become begrimed with dust and dirt, however, they soon reach the point where the object of such construction not only is defeated, but at all times presents the difficulties inherent in a hothouse, trapping the sun's heat and creating uncomfortable conditions on hot, sunny days.

The area required for satisfactory lighting naturally varies with conditions, not only of production, but of location. Where but little of the skylight is shut off by adjacent buildings, the window area should be at least 50 per cent of the wall surface exposed to the interior, and it may well be as much as 80 per cent. If light is cut off by surrounding buildings, the glass area requisite must be proportionately larger than would otherwise be necessary, according to the obstruction, and not infrequently may need to be all not essential to supporting the structure. In this connection it is necessary to consider also the possibility of future obstructions to light, and to make provision so far as possible to take care of contingencies.

The width of the floor also must be considered. If greater than 40 or 50 feet, all available wall space would better be glazed. It is, however, very undesirable to make use of floors of a width very much greater than this, not only because of the difficulties in the way of good lighting, but because of fire hazard and certain difficulties in ventilation, if not in heating. Experience has shown that 60 feet in multi-story buildings intended for general manufacturing purposes is quite satisfactory. This width is sufficient to permit the arrangement of machinery to good advantage, and satisfactory lighting if light can be admitted from both sides. With this width, however, ceilings must be 12 to 15 feet above the floors, and window openings are to reach from about the ceiling line to a

Effects Obtainable with Sawtooth Roof Lighting

In spite of the forest of belts and wilderness of transmission and countershafting here, the daylight effect is remarkable.

point say 3 feet above the floor. In the case of warehouses less light is essential, and where it is desirable to store materials against side walls the windows may have their sills considerably higher. Even in buildings intended for this use, however, care must be taken not to shut out light to the point where obscurity results.

The form and location of window areas will depend upon the type of building and materials of construction. In best recent practice in the case of reinforced concrete frame structures the light openings cover all the space enclosed by the structural members except low curtain walls for some distance above the floor level. In steel frame buildings, whether covered by brick or concrete, a similar area is feasible and generally desirable. In a brick structure where the walls form the supporting members, obviously the openings must be reduced to a point where there will be adequate strength in the masonry walls.

The form and style of sash is equally important with the size and location of light areas. The customary styles of wood sash, or of wood protected by metal sheathing, are scarcely feasible where openings are so large. Besides being clumsy in operation and difficult, in such situations, to design with architectural effect and strength at the same time, they take up a considerable proportion of the opening. Pressed metal sash are open to a similar objection, although they avoid the fire hazard of the wood. Wrought steel sash are, all things considered, most desirable in industrial buildings. They admit something like 20 per cent more light than the ordinary form of sash, are stronger and stiffer, offer excellent fire resistance when suitably glazed, do not stick in operation, and permit almost unlimited ventilation.

Method Combining Advantages of Sawtooth Roof and Lantern Lighting and Ventilation

Supporting trusses and continuous sash, as here applied to the sawtooth, in combination with large side lighting area, make it possible to get the much desired north light effect in buildings of the foundry and erecting shop type.

The matter of ventilation is one that must be considered in connection with windows. While it is entirely feasible to design and install reversible heating plants so that the same may be used for providing suitably conditioned air during the warm season, owners are slow to see the need for this, and in most instances it is necessary to provide for summer ventilation through a large use of movable sash. Sliding sash are feasible but permit at the best, under customary conditions, but half of an opening being utilized. Furthermore they require balancing either by use of weights or springs, or by being counterbalanced one against the other. Pivoted sash are to be preferred on both accounts, as well as because simpler mechanically, less expensive, and more easily operated, either singly or collectively. A vertical swing permits adjustment so as to obtain greatest advantage from outside breezes; but in most situations the horizontal pivot is preferred. This is especially the case where light-diffusing glass is used in the sash.

Both side walls should be provided with windows, unless of course the building is much narrower than already indicated as allowable. Much has been said in recent years of the ill effects of cross lighting. The ill effects may be admitted; but they result not so much from the admission of light from two directions as from misdirection of the light. It is essential that there be an even diffusion, no shafts of light, and obscure depths. With a moderate width of room and a large glazed area this will usually take care of itself. Where these conditions are impossible, or where adjacent structures shut off light, it is necessary to make use of diffusing glass. For this purpose ribbed or prism glass is most satisfactory and easily kept clean. The latter is better than the former. The ribs or prisms are to run horizontally — never vertically unless it is necessary to direct light into some corner

not otherwise illuminated. Maze glass breaks up light more effectively, or rather diffuses it more completely in all directions, and is to be used in comparatively narrow buildings, say up to 25 or 30 feet wide, to break up direct sunlight and secure an effect somewhat resembling the much desired north light. In such buildings so glazed the windows should be on one side only. In wider rooms, say to 60 feet, factory ribbed glass is required; and in still wider rooms, sheet prismatic glass is required. The ribs as mentioned are to be parallel to the floor.

Direction of Light Has Much to Do with Fatigue and Consequently with Efficiency in Production

Work benches and machines ought not be so placed as to compel workers to face the light, or to receive it on their backs. This arrangement is good. A better would be to set benches at an acute angle with the light source, so as to permit momentary glances outside with least effort and distraction from work.

In specifying glazing the mistake should not be made of setting the whole window area with translucent glass. Work people at all sorts of employment, whether manual, clerical, or mental, are subject to eye strain and headaches, and the train of ills consequent if they have no relief for the eye muscles. Such relief is most simply had by frequent looks away from the work in hand, preferably out of a window. The lower portions of all windows therefore should be glazed with plain glass. It may be pointed out also that plain glass is much more easily kept clean and is cheaper — two very good reasons for its use where diffusing glass serves no purpose. It should be borne in mind likewise that provision facilitating cleaning should not be omitted. In some types of building it may be necessary to provide platforms or supports for platforms. In most cases, however, it will be sufficient to require hooks or bolts for portable scaffolds or platforms, or for the cleaner's harness.

Facing the light, even when well diffused, is very fatiguing to the eyes, as universal experience should teach. The consequence of work benches and machines being disposed so that workers must face windows therefore is pernicious and mischievous and results in measurable loss in production and spoiled materials. It is entirely feasible to arrange both machines and work benches so the light will fall upon the work from the side instead of from front or back, which latter is almost as bad as the former. A still better method is to dispose them at an angle less than a right angle, to make it possible for work people to glance out the window momentarily to relieve the eye strain with least effort and loss of attention to the work in hand. This, of course, applies in the case of side lighting such as is necessary in multi-story buildings.

Another matter that must receive cognizance, especially in buildings of the type thus far under consideration, is that of possible additional buildings so nearly adjacent as to interfere with the influx of light. When adjacent land is in the control of the owner of the plant involved, this can usually be taken care of. Otherwise it is necessary to plan against the contingency of another owner disregarding the light needs of your buildings.

Example of Roof Lighting by Means of Flush Skylights

In this foundry the chief dependence for illumination is the large area of flush skylights. These can be made very effective, but involve some difficulties and disadvantages also.

There can be no question of the superiority of well designed methods of lighting from the roof; and wherever feasible, as manifestly it is not in multi-story buildings except for the top story, this should be utilized to the full either as a sole method or to supplement side lighting. Two objects are of primary importance in roof lighting: the avoidance of the glare and heat of direct sunlight and even suffusion of the working area. The latter can be accomplished by almost any method that really takes advantage of the diffused light of the sky, and as previously pointed out both can in considerable measure be secured by proper installations of side lights, although not to the same degree as well designed roof lighting.

Until recently the usual method of lighting from the roof, used in large buildings of the foundry or erecting shop type, was by use of "monitors," improperly so called, or "lanterns" surmounting the roof angles. Usually this method has been used in combination with side lighting, and frequently some such method is necessary yet in very wide and high buildings. Such lanterns perhaps facilitate ventilation, but certainly lack in effective illumination. A recent modification of the lantern method is a great improvement in that it takes advantage of a sky exposure either by swinging batteries of sash, or by being set at an angle to the vertical, or by both methods. The sides of such a lantern, when it has more than one glazed side, are set much farther apart than has been customary, and the effect is virtually that of a sawtooth roof with a limited number of teeth. A shop of this type can be as well ventilated and about as well lighted as out of doors. Experience has shown that in a foundry so designed the moulders tire less and produce considerably more output.

In Very Wide Buildings it Is Necessary to Diffuse the Light Admitted so as to Reach and Evenly Illuminate the Central Portions of Work Rooms

This is accomplished by use of various styles of moulded glass. Ribbed or even prismatic sheet glass is required in case of very deep rooms. The ribs must run horizontally; and the lower portions of the sash should be glazed plain, so as to permit workers to relieve their eyes by looking out.

The flush skylight, of comparatively recent origin, is an improvement upon the ordinary lantern or monitor lighting. So far as amount and intensity of light is concerned over the area penetrated this method fills the requirements. The difficulty generally is that the light is too intense and along with it there is much of the hothouse heat effect of captured direct sun rays, making the working areas frequently uncomfortable and at times intolerable. Of course in hot seasons the under surface can be whitewashed or otherwise covered so as to intercept some of the light. All these methods, however, have disadvantages and are not recommended. The substitution of more or less translucent fabrics or similar materials is not satisfactory either. The use of diffusing glass in considerable measure reduces the ill effects, but introduces another difficulty in maintaining the same in a sufficiently clean condition. Non-leaking settings are now available and are essential. There must also be provision for taking care of the drip of condensation in buildings for most purposes. The necessity is obvious in most kinds of manufacture.

Where such a roof is feasible, glass tile in combination with clay or cement tile are available, as are cement tile with water-tight glass settings. This forms a very satisfactory roof for many purposes.

The sawtooth roof introduced into this country a few years ago, when properly designed, is undoubtedly the best method of lighting now available in buildings to which it is adapted. It is, however, of prime importance that such a roof shall conform to the requirements of good sense, otherwise as has not infrequently happened the very object is defeated.

A sawtooth roof, then, takes advantage of light from the north in the northern hemisphere, avoiding direct sunlight so far as possible. The teeth are not so small that the structural and unglazed parts cover so much area that the aperture is greatly reduced. And the glazing is set at a suitable angle to the perpendicular — in the latitude of New York approximately 30 degrees. The angle may be greater farther north, the purpose being to make it maximum without at the same time permitting direct sunlight to enter in appreciable amount. Setting the sash vertically, as has been done in many instances, practically defeats the purpose of such a roof.

In early roofs of this type there were difficulties arising in connection with the drainage of the valleys. The simple expedient of short valley slopes draining through the roof by conductors following the supporting columns or other structural members reduces this difficulty. The use of horizontally ribbed glass here also aids in distributing light thoroughly. For reasons previously mentioned — the relief of eye strain in the workers — it is desirable that all buildings lighted from the roof should have also some plain glazed side windows if the work carried on is at all exacting. In many kinds of industries of course this is unnecessary.

A word is desirable as to the conservation of light also. In many work places the interior soon becomes grimy, if not dirty, even if the surfaces and contents of the rooms originally were light colored. Dark surfaces absorb light, whereas light tints reflect and diffuse. It is therefore important to keep interior surfaces clean and light colored. Whitewash is most commonly used, and if sprayed on the walls is the cheapest material. It either flakes off, however, or in time becomes thick with repeated coatings and is not so desirable as flat paint or other coating that adheres closely and is practically non-absorbent. Machinery, customarily painted black, should likewise be light colored. White is not so effective or desirable as a greenish gray, for color also bears a direct relation to fatigue resistance and it has been proven by carefully conducted tests that gray tones promote the maximum efficiency.

The Sanitary Equipment of Industrial Buildings.

By HAROLD L. ALT.

INDUSTRIAL buildings may be roughly classified — as far as sanitation goes — into two distinct groups. First, those in which high class work is performed by more or less skilled operators, some of which are likely to be women; and, second, those in which rough and heavy work is done, these usually being occupied entirely by men. To the first group belong all the factories for small metal parts and devices, clothes, cameras, and so on; to the second belong such buildings as foundries, planing mills, car shops, shipyard buildings, steel works, and similar establishments.

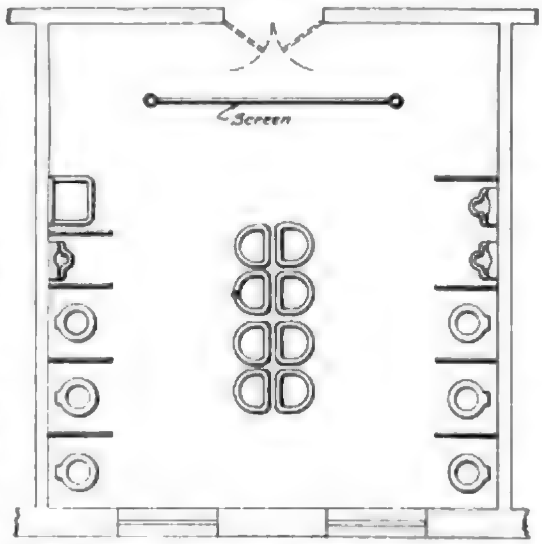


Fig. 1. Typical Arrangement of Toilet Rooms in Buildings of the First Class

The architect will find himself more at home in the design of plumbing for buildings of the first class, the fixtures for them being more or less in accord with standard plumbing practice for all good buildings; whereas in the second class the employees, from the rough and begriming nature of their work, do not appreciate nor need elaborate fixtures, and to any one accustomed to what is commonly termed "first-class work" the fixtures and substitutes for fixtures (which are sometimes found to give the most satisfaction in buildings of *this* kind) are rather startling in their apparent crudeness.

In designing sanitary work for such buildings the following requirements must be considered: state labor law, local building requirements, city plumbing ordinance, number of employees, sex of employees, locations of larger groups of employees, distance to toilet facilities, initial cost and upkeep.

The buildings of the first class employ good, substantial fixtures with some modifications for serving a large number of employees.

The state labor law usually provides for the number of fixtures, ventilation of rooms, number of lockers, etc. The building code generally covers the type of construction, thickness and material of floors and walls, and other details of construction, while the plumbing code is likely to cover the piping of the fixtures and methods of venting same. These may overlap or interlock in a more or less confusing manner, and a careful study of each must be made in order to meet all the interrelated provisions.

In general the toilet-room floors should be of a waterproof substance, concrete being the material commonly employed; this should be finished around the wall with a sanitary cove base and the walls should be of non-absorbent character, if possible. The toilet-room partitions should also be of an impervious nature, the favorite materials being iron and slate — iron generally considered the more serviceable.

The number of fixtures is always a subject for discussion, but the labor law of one of the greatest manufacturing states in the union allows a sliding ratio of water closets to occupants running from 1 to 17 for small numbers up to 1 to 30 for 300 or over. Urinals are allowed to be substituted for men's water closets up to one-third of the total men's fixtures required; thus:

For 1000 men, $\frac{1000}{30}$ equals thirty-four fixtures required, of which one-third can be urinals, or eleven, and the remaining twenty-three fixtures water closets. If the employees consisted of 500 men and 500 women, then the number of fixtures for men would be $\frac{500}{30}$, or seventeen fixtures, of which one-third, or five, would be urinals and twelve water closets. For the women the number required would be $\frac{500}{30}$, or seventeen water closets.

The lavatories under the same law are based on from 1 to 20 to 1 to 25 employees unless lead, chemicals or other poisonous substances are used where the ratio is made 1 to 10. The writer personally

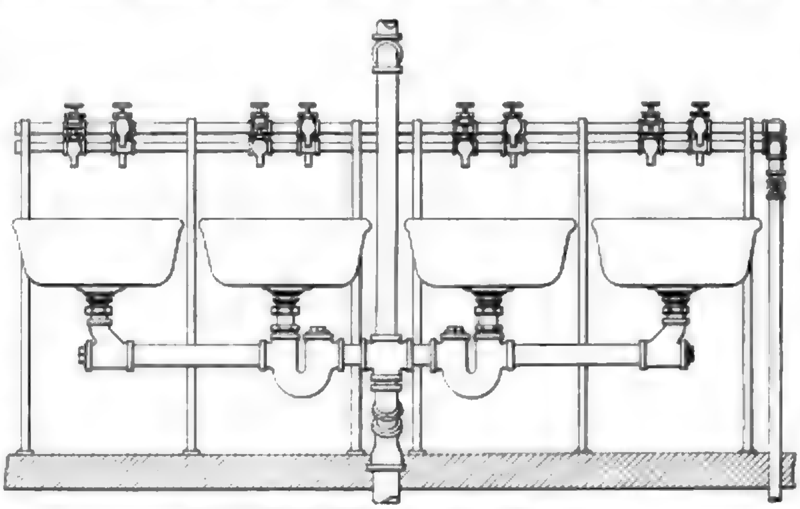


Fig. 2. Detail of Piping for a Battery of Lavatories

believes that the ratio of 1 to 20 is entirely too high and that 1 to 10 should be used at all times to encourage personal cleanliness among the employees.

Among buildings of the first class the tendency is to separate the lockers and washing facilities, placing the lavatories or wash sinks either in the toilet rooms or adjacent thereto, as shown in the typical arrangement given in Fig. 1. In these better class buildings it is the custom to provide separate porcelain lavatory bowls, — often buff in color, — although enameled iron can be secured at less cost.

The piping of a large number of bowls with a separate trap, waste, and vent for each bowl rapidly runs into a considerable expenditure. Permission can usually be secured from the local authorities for work of this kind to place from one up to six lavatories on one 2-inch trap. This dispensation is often obtained on account of the local influence possessed by the owners of a large plant and the realization of the authorities that such work is not rightfully subject to all the refinements included in the scope of modern sanitation.

The piping for a battery of lavatories such as is shown in Fig. 1 is given in Fig. 2, where two bowls are shown connected to each trap. This arrangement can be enlarged by connecting more bowls on the end of the 2-inch waste until the limit of six is reached. Over this limit the stopping up of a single trap would incapacitate so many bowls as to make such economy unwise. The individual enameled iron lavatories are similarly piped, and an end elevation of the piping is given in Fig. 3.

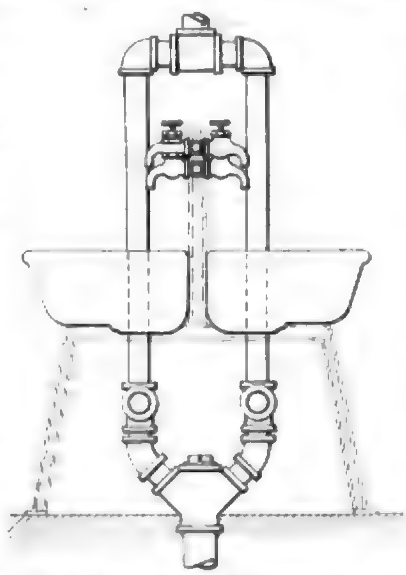


Fig. 3. End Elevation of Piping for a Battery of Lavatories

In buildings of the second class the lockers and washing facilities are usually combined in one room so as to make the fixtures as handy as possible. Under these circumstances an arrangement such as shown in Fig. 4 is used, and sinks of galvanized iron are generally substituted in place of the lavatories. In this room are shown two sides with 27 lockers each, or 54 lockers, a double middle row of 40, one row of 23 along the outside wall, two rows of 7 each along the inside wall, and 48 in the groups adjacent to the two sinks, making a total of 179.

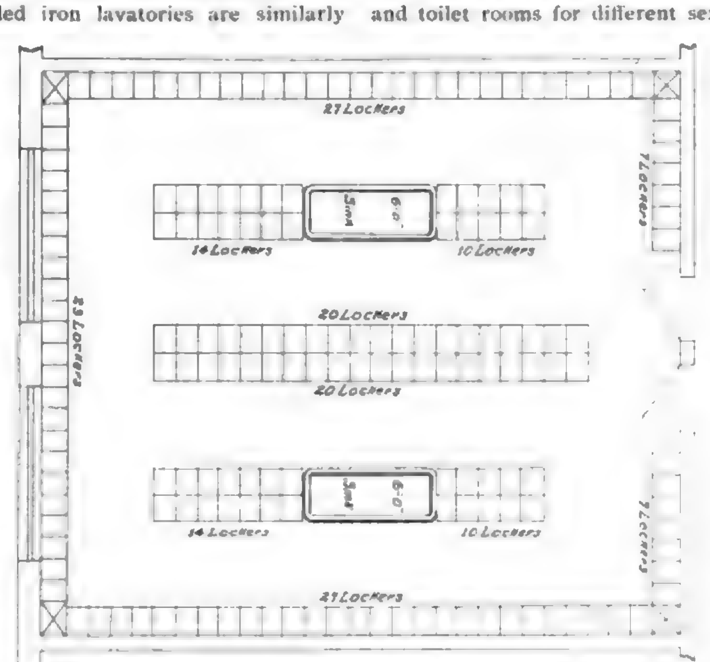


Fig. 4. Typical Arrangement of Lockers and Washing Facilities in Second Class Buildings

Where sinks are used, 20 inches of side, not counting the ends, is considered the equivalent of one lavatory, so at the ratio of one lavatory to every 10 men there will be required 179 10 equals 18 lavatories, or 18 x 20 inches equals 30 lineal feet of sink. Each sink having two sides this means the overall length of sink equals 15 feet. This amount of lavatory space can be obtained in stock sizes, as two sinks each 6 feet long, or two each 8 feet long; but as the ratio of 1 to 10 is low, the two sinks 6 feet long would be enough.

These sinks are supplied through convenient faucets, but have only one waste and vent. They are installed with non-syphoning traps as shown in Fig. 5, wherever the local restrictions can be modified to permit such an arrangement. It is advantageous to adopt this arrangement if possible, as it obviates the carrying of a vent up to the ceiling at every fixture.

In the toilet rooms it is customary to arrange the fixtures together as closely as possible, water-closet stalls being seldom over 30 or 32 inches wide and 2 feet 6 inches deep, without doors. In the women's toilets, doors are, of course, often used and are even required by the factory laws in some states. In such a case the stalls are necessarily made 4 feet deep. Entrances to toilets in buildings where both sexes are employed should be carefully screened, and toilet rooms for different sexes should be separated by solid partitions of full height.

For the 187 employees whose locker and wash sinks are shown in Fig. 4 a toilet room somewhat as shown in Fig. 6 is suggested. The number of fixtures is obtained as follows:

187 divided by 20 equals 9 fixtures required.
9 divided by 3 equals 3 urinals.
9 minus 3 equals 6 water closets.

One lavatory and a slop sink are also usually placed in each toilet room. Were these employees female, a toilet room somewhat as indicated in Fig. 7 would make a good arrangement.

Water closets of the wash-down type either with or without the jet are much used, generally with a flush valve. The automatic compression tank closet makes a more ideal fixture, but it is more expensive. Both these closets are of such common type as to make a discussion of their characteristics unnecessary here. The low and high tank types of closet are little used, owing to their being subject to troubles from tampering. Water-closet ranges are in use in some of the steel mills and foundries where a large part of the force is formed by ignorant and careless foreigners on whom up-to-date accommodations would be, to a large extent, a waste of money.

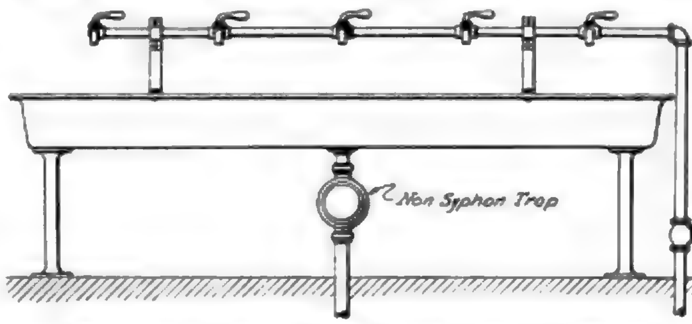


Fig. 5. Detail of Plumbing for Wash Sinks in Second Class Buildings

The best type of urinal is undoubtedly the 18-inch stall fixture such as is shown in Fig. 8, this keeping the floor in a better and cleaner condition than any other style of fixture. The slate urinal of trough type with an inclined back and perforated flush pipe is also much used, although when all things are considered it is, if anything, more expensive than the fixture shown. Where slate urinals are installed on upper floors, lead safes have to be provided to prevent leakage troubles. The lip urinal is not satisfactory for industrial use and on a trough urinal 24 inches of length is considered equal to a single stall fixture.

The location of toilets should be determined to permit the employees' access to them without too long a walk involving loss of time from their work. In a long narrow building two toilets, one in the middle of each section, are preferable. The length of travel should not exceed 200 feet unless absolutely necessary. In shops where men only are employed much time is saved by installing urinal stations at various points in the shops and making the men travel to the toilet rooms only when water closets are required.

Similar principles apply to the location of drinking water fountains except that the length of travel should be kept down to as near 100 feet as possible. Because the fountains are often provided so frequently they come in locations, in many buildings, where soil and waste stacks are a great distance from them and even the sanitary sewer may be inaccessible. From this has developed the practice of running a drinking fountain waste stack with the bottom connected into the nearest leader line and the top carried through the roof. Into this stack the fountains on the various floors are trapped. The fountains themselves are most satisfactory when of the pedestal type with a heavy cast iron base and vitreous bowl and bubbler, similar to the one shown in Fig. 9. These can also be secured with a small ice tank in which a coil is placed, the water to the fountain coming through the coil.

Shower baths are most economically constructed of slate, with a concrete trough lined with zinc, lead, or copper. The bathers stand on wooden gratings, and a slate step or curb is provided to form the front side of the trough.

Fig. 10 shows a six-stall shower of this construction and will offer a basis for modifications to suit the various conditions encountered. Generally speaking, showers should be provided where there is any process of manufacture involving either dust or high temperatures to which employees are exposed during their labors. The client, in the majority of cases, is familiar with the matter of whether showers are desirable or not.

Hot water for showers and lavatories is very desirable, there being no place where cleanliness is more needed than by persons spending eight to ten hours in the dust, dirt, and heat necessarily accompanying some of the industrial processes. In spite of this the hot water system is often installed only after considerable protest is made against its omission. Owing to the out-of-the-way and widely separated locations frequently selected for the various fixtures automatic gas heaters are becoming quite popular. With them long runs of steam pipe are avoided, the problem of returns is not encountered, and the heaters themselves require little attention. They do require flues, however, which must

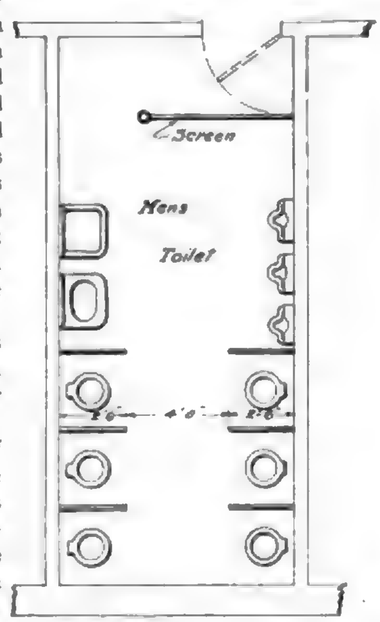


Fig. 6. Toilet Arrangement for 187 Male Employees

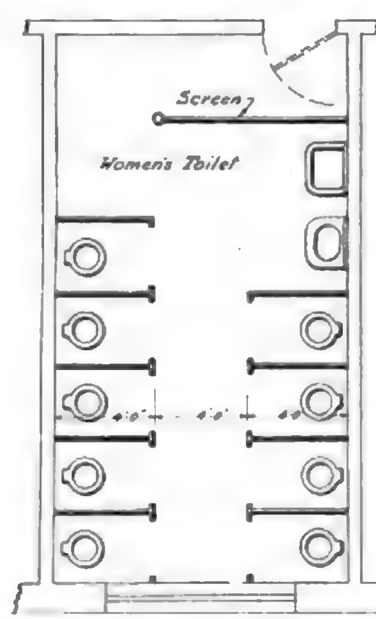


Fig. 7. Toilet Arrangement for 187 Female Employees

be carried up through the building and above the roof — an item of no small importance, especially in concrete structures.

The most common method of heating hot water is by an instantaneous steam hot water heater supplied with steam through a special reducing valve and not connected to the steam heating system in any way. The returns go to a trap — of the lift type if necessary — and can then be returned to the feed water heater. The reason for not connecting to the low pressure heating mains and using exhaust steam is that during the summer these lines will not be in operation and the hot water heater would be thrown out of commission.

In the larger buildings say of 500,000 square feet or over it is hardly practical to consider gas heating, unless natural gas is obtainable, owing to the expense of operation. Coal at $4.00 per ton (a high rate) will supply about 8,000 B. T. U. per pound for heating water at a cost of $.002 per pound, or 8,000 B. T. U., while even natural gas contains only about 1,000 B. T. U., of which not more than 90 per cent could be available, or 900 B. T. U. per cubic feet at .40 per M means $.0004 per cubic feet, or 900 B. T. U., which is just one-fifth the cost for one-ninth the heat. Transmission losses in the steam and return lines will reduce this probably to a point where the cost of gas heating will about equal that of coal.

It is the regular practice to run all pipes of every kind exposed, except the house drain, which is usually of cast iron soil pipe and buried under the lowest story. Owing to the fact of all piping being exposed, replacement at any time is comparatively easy and it is, therefore, not made of as permanent and lasting a character as would otherwise be the case. Black iron roof leaders are often used, brass pipe for hot water but seldom, and plain steel in the place of genuine wrought iron almost invariably.

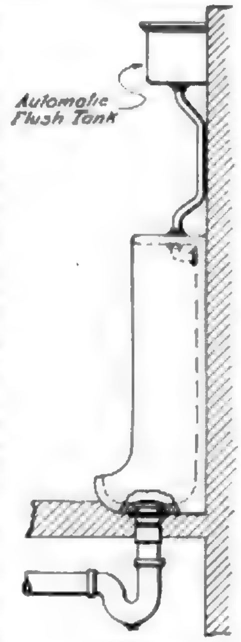


Fig. 8


Fig. 9

On the inside leaders conductor boxes are commonly omitted, the flat copper flashing extending out about twelve inches all around the top of the copper funnel to which it is soldered. This funnel tapers from two inches larger at the top than the nominal size of the leader pipe to the same diameter at the bottom; a neck piece about three inches long projects from the bottom of the funnel and is slipped into a common pipe coupling at the top of the leader pipe. Between the end of the neck and the top of the pipe a space of about one inch is left for expansion, settlement, etc., the neck sliding up and down inside of the leader coupling. The joint between the neck and the leader pipe must not be made tight, otherwise trouble is sure to result. The writer is personally familiar with a large factory of only one story height where the architect specified tight connections between the top of the leader and the copper funnel, and as a result of the contraction and expansion of the pipe, combined with settlement of the structure, every funnel was broken off at its point of connection to the flashing inside of three years from the date of completion of the building. If a tight connection must be used, a short piece of D-lead pipe just below the funnel will aid in absorbing some of the movement.

The above is indicative of the practical side of industrial sanitation and should serve as a suggestion from which a solid and economical installation can be intelligently developed.

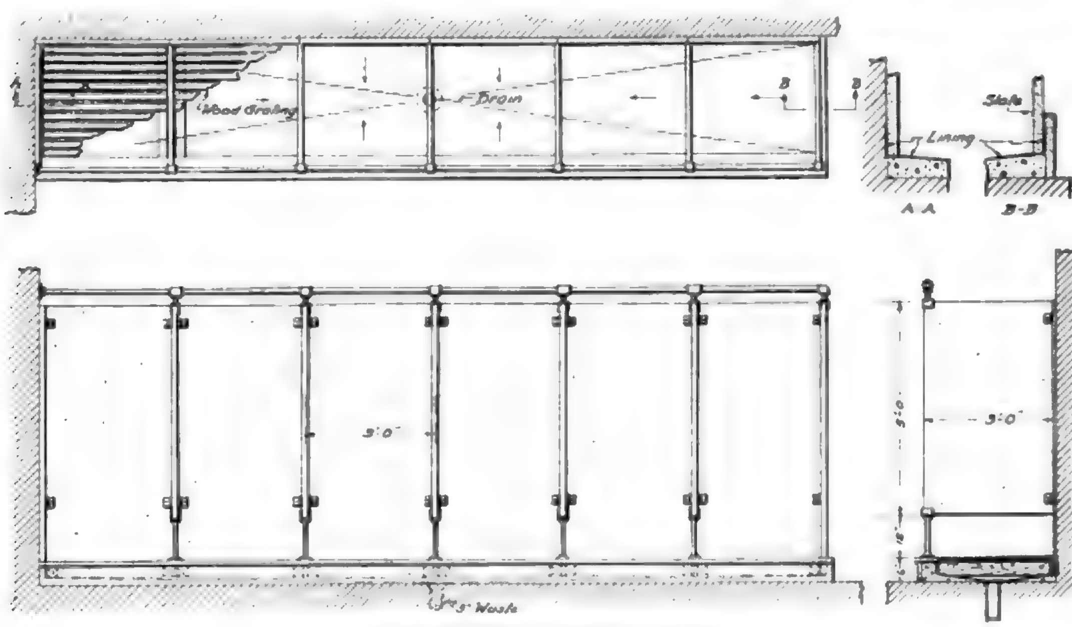


Fig. 10 Detail of Six Stall Shower Baths

PLATE DESCRIPTION.

Printing House of R. R. Donnelley & Sons Company, Chicago, Ill. Plate 137. This building is planned to eventually cover an entire block and is so designed that it may be carried to an ultimate height of seven or eleven stories. It is of reinforced concrete construction with mushroom columns placed 24 feet 4 inches by 24 feet 10 inches on centers to permit the largest modern presses to be placed in the bays. The diameter of the columns in the lower stories is 39 inches and they are belled at the top to a diameter of 5 feet 9 inches. The story heights are 11 feet for the basement, 14½ feet for the first story, and 12½ feet for the remaining stories, the floor slabs being 11 inches thick, figured to carry a live load of 350 pounds to the square foot. Fire escapes are provided in brick towers at the corners of the building, cut off from all floors and entered through a communicating balcony.

Farmers' Trust Company Building, South Bend, Ind. Plates 138, 139. This building is designed for offices above the main story and for bank and store purposes on the street level. It is entirely of fireproof construction, the exterior piers being of masonry reinforced with steel, and the interior columns and girders of steel and concrete. The floors are of reinforced concrete and tile. The two end pavilions have no center columns and provide areas 34 feet wide by 84 feet long. The building has a capacity of 1,330,000 cubic feet and cost 21 cents per cubic foot.

Hump Hairpin Manufacturing Company Building, Chicago, Ill. Plate 140. This building is entirely of fireproof construction, the outside walls being of brick with a facing of medium gray rough textured brick. The floor and roof are of reinforced concrete construction. The floor spans are large, being 24 by 36 feet so that there would be least interference of columns with continuous lines of machinery. The building covers an area of 175 by 192 feet, and has a clear story height of 16 feet. In addition to side lighting it has sawtooth top lighting and is provided with a large amount of mechanical ventilation. The cost was about 12 cents per cubic foot.

Reid, Murdoch & Co. Warehouse, Chicago, Ill. Plate 141. This building is of reinforced concrete construction on a wood pile foundation, the floors designed to carry a load of 250 pounds per square foot. Structural steel was used for the tower roof construction and for the 40-foot span trusses in the second story over the railroad shipping court. The story heights are 9 feet 6 inches for the subbasement, 14 feet for the basement, 16 feet 8 inches for the first floor, and 12 feet for other floors. The total area of all floors is 443,300 square feet. The building cost, including dock and plumbing work 12 cents per cubic foot.

Havana American Company Building, Chicago, Ill. Plate 142. This building is used for the manufacturing of cigars and is of mill construction with brick walls. Supporting posts and girders spanning 15 foot 8 inches are of wood and the 5-inch splined flooring spans 14 feet. The special truss roof construction spans 28 feet and carries sawtooth skylights. The floors are designed to carry 150 pounds live load, and they have a total area of 103,000 square feet. The building is two stories high, 455 feet 10 inches long and 112 feet 5 inches wide. The first story height is 15 feet 10 inches, the second story 14 feet to the bottom chord of the skylight trusses. The total cost of the building, including mechanical equipment, was 7.9 cents per cubic foot.

Liquid Carbonic Company Plant, Chicago, Ill. Plate 142. This group of buildings is used for the manufacture of soda water fountains. The main building consists of two 4-story wings, extending west and south from the corner tower, and a 1-story marble shop running west from the south wing. The tower is 28 feet square, the west wing 630 feet long by 80 feet wide, and the south wing 316 feet long by 80 feet wide. The marble shop is 144 feet wide by 399 feet long. The main portions of the plant are of reinforced concrete construction with brick exterior facing. The typical story height is 14 feet. The cost of the buildings without equipment was 7.5 cents per cubic foot.

Kent Building, Chicago, Ill. Plate 144. This building is occupied entirely by a clothing manufacturer. The general offices are located on the first floor, the power plant and shipping room in the basement, and the display room on the top floor, which is unusually high and lighted from the roof. Stairways and elevators are enclosed with fireproof partitions. Foundations are of concrete on piles and exterior walls are self-supporting above the fourth story. Interior columns are cast iron, carrying steel beams and girders and flat tile floor arches. The typical girder span is 17 feet to column centers and typical beam span 18 feet to girder centers. The building has a total capacity of 2,184,000 cubic feet and cost 17.4 cents per cubic foot, including a sprinkler system.

Factory Building of M. T. Silver & Co. and the Sunshine Cloak & Suit Co., Cleveland, Ohio. Plate 145. This building is used for the manufacture of clothing by two different firms, each occupying half of the building. It is constructed with brick exterior walls. Columns and floor slabs having a span of 20 feet are of reinforced concrete. Finished floors are of maple.

Warehouse of J. R. Watkins Medical Company, Winona, Minn. Plate 146. This building is of reinforced concrete construction and is faced on the exterior with light gray pressed brick. The total height of the building is 120 feet, with a tower rising to 190 feet from the grade line. It contains two water tanks each having a capacity of 25,000 gallons. The floor spans are 17 feet 3 inches by 19 feet and the floor slabs are 10 inches thick, designed to carry 450 pounds live load throughout the building. All sash is steel, glazed with wire glass. The cost of the building was 15½ cents per cubic foot.

Factory Building of Blumenthal Brothers, Frankford, Philadelphia, Pa. Plate 150. This building is used for the manufacture of chocolate and cocoa. The material is handled in a direct route from the top to the lower stories, and through the length of the structure to the shipping point. The building is of slow-burning construction with fireproof floors where safety requires. The exterior walls are of brick faced with a deep red brick with dark headers and trimmed with terra cotta. The story heights are 14 feet from floor to floor and supporting columns are spaced 20 feet on centers in each direction. Cost for construction alone was 5.8 cents per cubic foot.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE ENGINEER AND THE ARCHITECT.

THE architect is always an engineer; but the engineer, even though he has charge of the construction of a building, is seldom an architect. The greater always includes the lesser. Both the engineer and the architect have had their share of the world's work. The great spectacular achievements such as railroads and canals have fallen to the engineer and his practice has crystallized into an exact science. Architecture, on the other hand, always has been an art. That is what makes architecture more than engineering and keeps it perennially alert and ready for changes — a condition which rarely exists in the engineering profession. It is but fair also to admit that because of the readiness with which the architectural profession welcomes new ideas, because of its constantly changing point of view, it is apt to lag behind in attention to the exact sciences and the so-called practical work. This has been strikingly manifested during the past generation. The architectural profession was offered the enormous possibility of steel construction. The æsthetic side of it was immediately appreciated and developed to an extent which has produced results of which we may well be proud; but the so-called engineering features were in a measure ignored, not because architects could not master them, but because the really architectural solution had first to be sought. The engineers speedily usurped one side of the architectural problem, and our earlier steel frame buildings were designed wholly by engineers, with the result, unfortunately, that sometimes the construction was made more of than the architecture, and efficiency of the hidden was substituted for complete efficiency of the whole. During the last few years the conditions have been changing and to-day it is fair to say that in most of the properly organized architectural offices the mechanical and so-called engineering problems in building construction are handled by the architect, and handled in a better, a more consistent, a more economical, and a more logical manner than the same problems were handled by the engineers in the earlier years. This is not saying that all architects are qualified to do their work. A profession is not judged by even its average attainment, but by its best work; and applying this measure to architecture it is fair to say that architects have outgrown any necessity of depending upon the engineers for construction.

On the other hand the engineers themselves have changed in their attitude toward architects. Structural engineering as a profession has not been very profitable of late years, and this fact has awakened many engineers to the possibilities of combining architecture with their own work. Since, unfortunately, the only requirement to be an architect is the ability to pay for a sign on the door, any one who can get a job can call himself an architect, and we have in many of our cities engineers who simply hire draftsmen, trust to their artistic luck, and get by with a good deal of building. In a few cases such engineers have developed real architectural talent, which the profession has been glad to recognize; but in more cases the result has meant a distinct lowering of architectural standards, and it is to be regretted that men who could be good engineers should choose to be poor architects for the sake of a little increased earning capacity. Most property owners would very naturally and very rightly prefer a good engineer to a poor architect, and as so many people fail to appreciate that architecture is not merely construction, heating and ventilating, plumbing and electric equipment, but is fundamentally an orderly, logical, and artistic solution of a practical problem, it is not to be wondered that the engineer-architect has thriven of late years; but this does not mean a limitation of architecture. Anything that makes for better building of any kind, practically or artistically, is welcomed by any right-minded architect; and if an engineer can do better work than an architect, it is up to the architect to mend his ways, though, as we said before, the thoroughly well equipped architect to-day needs very little help from the engineer.

The architect has learned his constructive lessons, and the relation now between the professions is that the engineers are learning to follow the architects' footsteps and striving to clothe engineering with a thin veneer of architecture. That, as far as it goes, is good. Anything which relieves the crass materialism and crude efficiency of an engineering structure is a benefit to the community, and we would hope that the relation between the two professions may continue to be one in which the architect will point the way to better, more orderly, and more logical building, without any sacrifice of the innate architectural properties, and the engineer will be more willing to appreciate that real efficiency does not stop with a well constructed skeleton; that no amount of good mechanics can atone for a bad design, and that good looks constitute a commercial asset.

BEAUX ARTS INSTITUTE OF DESIGN.

IT IS under this title, and incorporated under the Board of Regents of the State of New York as a school to teach design in Architecture and also Sculpture and Mural Painting in their relation to Architecture, that the educational work hitherto conducted by the Society of Beaux Arts Architects will henceforth be known, this society having voluntarily surrendered the educational privileges of its own charter so that a new institution, controlled, however, by the same principles and persons as the former, might extend itself into fields broader than those of a purely architectural association. Circulars of information for courses may be obtained by writing to the Beaux Arts Institute of Design, No. 126 East 75th street.

THE BRICKBVILDER AN ARCHITECTVRAL MONTHLY

OCTOBER
1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS

DOMENICO FONTANA

ITALIAN ARCHITECT. BORN 1543. DIED 1607. ARCHITECT OF WORK AT ST. PETER'S, ROME, INCLUDING COMPLETION OF MICHELANGELO'S DOME AND TRANSPORTATION AND ERECTION OF OBELISK IN THE COURT

THE BRICKBVILDER

VOLUME XXV OCTOBER, 1916 NUMBER 10

The Dome of St. Peter's, Rome.

A STUDY OF ITS STRUCTURAL SYSTEM.

By RICHARD FRANZ BACH.
Curator, School of Architecture, Columbia University.

I.

RENAISSANCE architectural history is writ large in the fabric of St. Peter's. From the attempt on the part of Rossellino in 1450 under Pope Nicholas V to rebuild the Gothic cathedral, to the completion of the colonnaded atrium by Bernini, and the lantern and altered dome contour by Della Porta and Fontana is a space of over one hundred and fifty years, comprising the full sweep of the *risorgimento* from faintest traceable beginnings to the Gargantuan orders of Michelangelo that contained the germ of a megalomaniac decline. The crowded chapters of the history of this building, beginning 1506, fall, however, within the resplendent pontificate of the warlike Julius II, whose sepulcher it was first designed to house. The story of the building as a whole cannot here be given space.* It carries us through a succession of memorable careers, each at its zenith and each at some time granted the sole guidance of the undertaking: Rossellino (1409-61), Bramante (1444-1514), Giuliano da San Gallo (1445-1516), Raffaelle (1483-1520), Fra Giocondo (1435-1515), Peruzzi (1481-1537), Antonio da San Gallo the Younger (1482-1546), Michelangelo (1474-1564), Del Vaga (1500-47), Ligorio (1530-86), Vignola (1507-73), Della Porta (d. 1601), Fontana (1543-1607), Maderna (1556-1629), Bernini (1598-1680), more than half the number being responsible for new plan suggestions in the course of which the conception of a mausoleum for the pope was early lost in that of a monumental central church of Christendom. Bramante's plan formed the nucleus of most that followed, and its relegation has often been regretted by students of the work. From the first the scheme of Julius II had been vaguely that of a domical building, and the dome feature as a central motive retained its vitality to the end, abetted by the completion of the fine project of Brunelleschi at Florence, as well as the example of numerous other domed churches in Italy, which gave to the motive a growing vogue of importance as a dignified crowning mass for a building of churchly use. As design succeeded design, a rivalry arose between the Greek and Latin cross type of plan for the entire edifice, — the first favored scheme by Bramante being of the former, — the two forms then gaining support in alternation, until the quarrel was seemingly set at rest by Michelangelo, whose plan was fully executed, only to be modified in turn by Maderna's additions to the eastern arm,† which restored the Latin cross type at the expense of the effectiveness of the dome, which as a result of the increased nave length cannot be seen to advantage for a distance of over 1,300 feet beyond the front of the building.


Dome of St. Peter's, Rome

Bramante's dome project promised a "Pantheon hung in heaven," its base forming an articulated drum surrounded by a peristyle as its principal motive, the whole surmounted by a lantern, and the diameter of the plan being equivalent to that of the ancient

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*See bibliographic note p. 254.

†St. Peter's main façade faces eastward, as in the early basilicas and contrary to the usual mode of orientation involving a "west front."

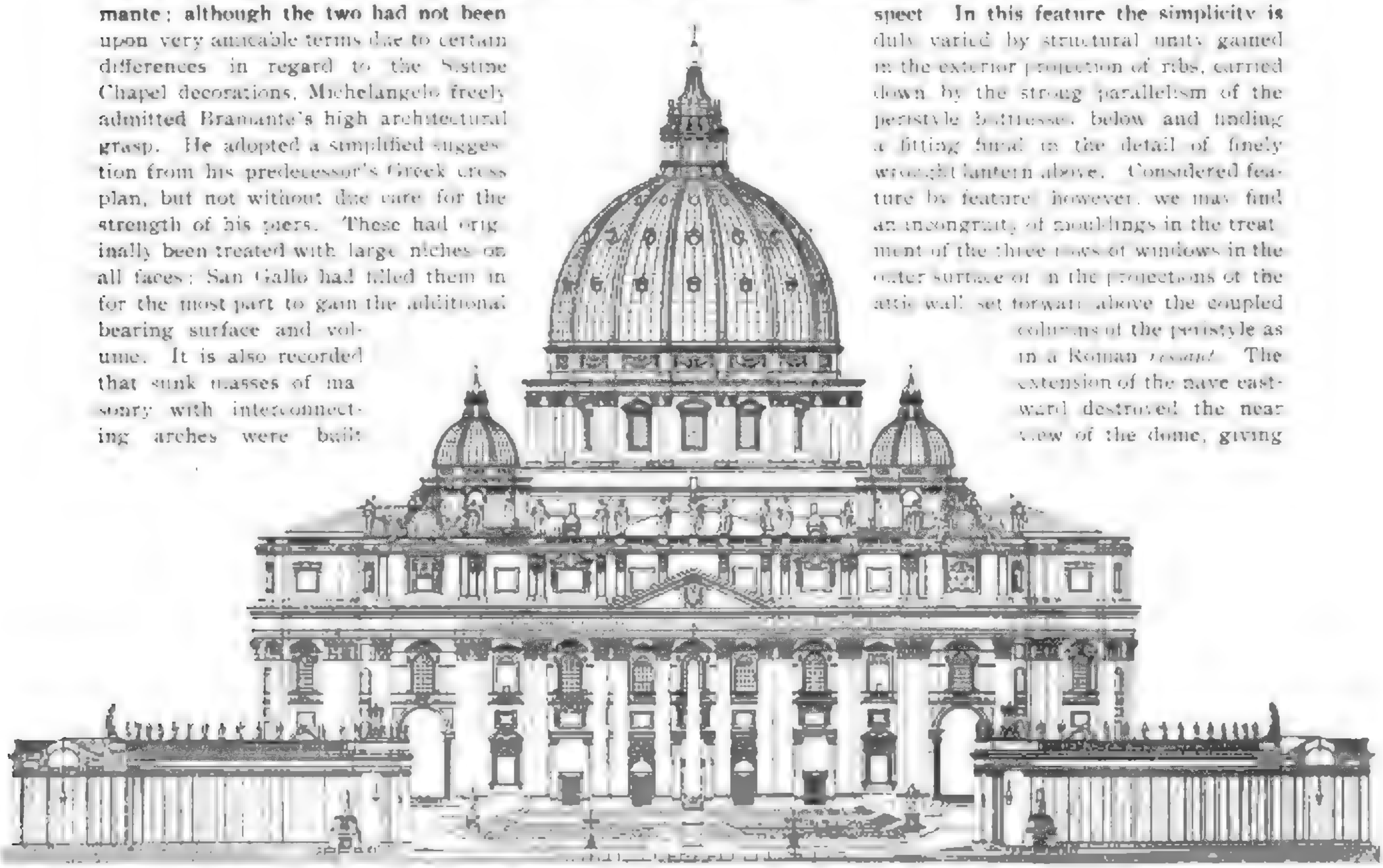
Roman building—about 142 feet. Bramante completed the four great piers and pendentives and had, before his death in 1514, turned the enormous arches that spanned them and were to form the primary square (resp. octagon) of support. Raffaelle's work, and that of a number of others, was chiefly on paper, for the project never ceased to attract the pencils of a large number of fertile brains, whose qualifications were far beneath the requirement for bringing the work to execution.

The task was distinctly beyond Raffaelle's grasp. Although interested to the extent of leaving well studied plan solutions, Peruzzi's contribution and also that of both San Gallo was largely that of making good the defects due to Bramante's haste, for the latter was anxious to gratify Julius II by completing at least the essential portion of the building that was to shelter his tomb, upon the sculptural decoration of which Michelangelo meanwhile was wasting valuable years. The piers were found to be too weak and the arches had begun to show fissures. Fortunately building activity did not go forward on such large undertakings with the speed required in more recent times; calamity would surely have followed any further execution on Bramante's understructure, erected upon hastily made ground, bearing piers of insufficient and inferior masonry.

Michelangelo's work upon the building dates from 1546. He repeatedly maintained that he could do no better than carry to completion the splendid work of Bramante; although the two had not been upon very amicable terms due to certain differences in regard to the Sistine Chapel decorations, Michelangelo freely admitted Bramante's high architectural grasp. He adopted a simplified suggestion from his predecessor's Greek cross plan, but not without due care for the strength of his piers. These had originally been treated with large niches on all faces; San Gallo had filled them in for the most part to gain the additional bearing surface and volume. It is also recorded that sunk masses of masonry with interconnecting arches were built beneath two of the piers, in order to equalize the foundations, which in the other two bore directly upon parts of the old Roman circus.

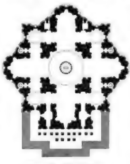
Michelangelo is chiefly responsible for the dome, its construction and massive effectiveness, but the actual silhouette and contour are due to a remodeling of Michelangelo's design in wood by Della Porta and Fontana, tending toward a more pointed section. Michelangelo set his mind singly upon the completion of this masterwork, as did Brunelleschi upon the Florentine cupola before him, and as though the myriad commissions for statues and paintings and other buildings did not exist. Like his predecessor, he, too, was beset with intrigues and obstructionism to the end. For seventeen years, having accepted full direction of the work at the age of seventy-two, and throughout refusing all remuneration, he conducted the undertaking almost single handed, as he did also the Sistine frescos and a multitude of other commissions, leaving no broadcast heritage to pupils fostered in his powerful mode of art interpretation, and thus largely contributing to the alien mannerisms that helped to hasten the decline of a great period.

While the building as a whole is so generally regarded as a failure, due to its simplicity exaggerated by a giant scale of all minor motives as well as of leading lines, its egregious orders and the bungling additions of Maderna, whom Ferguson delights in calling "a very second-class architect," the dome itself cannot be censured in this respect. In this feature the simplicity is duly varied by structural units gained in the exterior projection of ribs, carried down by the strong parallelism of the peristyle buttresses below and finding a fitting finial in the detail of finely wrought lantern above. Considered feature by feature however, we may find an incongruity of mouldings in the treatment of the three rows of windows in the outer surface or in the projections of the attic wall set forward above the coupled columns of the peristyle as in a Roman *ressaut*. The extension of the nave eastward destroyed the near view of the dome, giving



Dome of St. Peter's, Rome. Elevation of entire building as completed, including final dome contours, altered front, and atrium with colonnade
(From Letarouilly and Simil)

from that direction the impression of a giant "with head pressed down between his shoulders"; but the full curve of its contour is adequately to be gauged on the axis of either transept arm, on that of the principal apse, or from the direction of the intermediate angles. Its substructure does not profit by its garment in the form of a 108-foot order surmounted by a further height of 39 feet in an uninteresting attic motive. A hopeless attempt at variety is witnessed in the frames of windows in two stories between grouped pilasters and in four stories within the groups, the motives being of negligible æsthetic value, except as a deterrent may have such value. One senses to a certain degree the curious handicap which so readily characterizes Michelangelo's minor works in the architectural field — the Farnese Palace cornice being a shining exception — a field which according to his repeated assurances he would gladly have eschewed for that of sculpture — a curious lack of taste difficult to analyze or explain, unless it be called lack of architectural sense or poise, and which is exemplified in remarkable fashion in the Porta Pia in Rome, to which, fortunately, the name of Pirro Ligorio (who together with Vignola assisted Michelangelo on the dome project when the climbing became too difficult for his years) has also been attached.



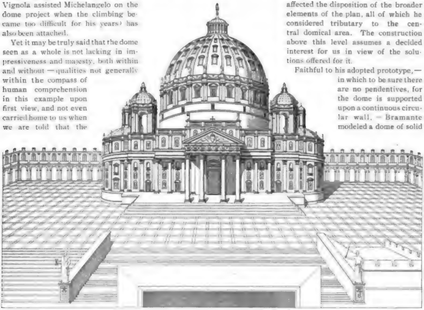
Dome of St. Peter's, Rome
Plan of Michelangelo's design

Yet it may be truly said that the dome seen as a whole is not lacking in impressiveness and majesty, both within and without — qualities not generally within the compass of human comprehension in this example upon first view, and not even carried home to us when we are told that the Corinthian capitals bear 7-foot acanthus leaves and that St. Luke in one of the pendentive mosaics writes with a pen at least as long. When regarded from this angle of scale alone, one is prompted to favor the suggestion that uniformed vergers be obliged to wander about the building carrying the accepted 10-foot scale wands, as an index of the "human scale" which has been so consistently disregarded throughout.

II.

Logically the plan of the church is mainly dependent upon its central feature, which so insistently prompted the Greek cross plan type. Apart from the damaging additions, Michelangelo's solution was that of a nave and flanking aisles intersected by a similar arrangement, the dome appearing as a culmination at the crossing. The dimensions of the dome space were immediately fixed by Bramante's desire to emulate the Pantheon; the piers, cross arches, and pendentives being in position, however faulty; the abutting construction likewise offered but little opportunity of variation except in repetition of bays, at least up to the level of the final circle closed by the upper pendentive arcs, and Michelangelo's changes therefore affected the disposition of the broader elements of the plan, all of which he considered tributary to the central domical area. The construction above this level assumes a decided interest for us in view of the solutions offered for it.

Faithful to his adopted prototype, — in which to be sure there are no pendentives, for the dome is supported upon a continuous circular wall, — Bramante modeled a dome of solid



Dome of St. Peter's, Rome. Michelangelo's design for entire building. *(From Letarouilly and Simil)*

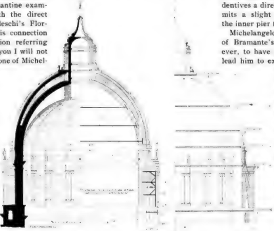
Dome of St. Peter's, Rome. View looking downward to altar from oculus

masonry and of semicircular section, surmounted by a lantern frankly suggested from Brunelleschi's in Florence. Antonio da San Gallo likewise proposed a solid, single shell dome 42 feet thick at the base and 17 feet thick at the crown. One marvels at the intentions of both when it is considered that the very skeleton began to give way of its own weight, before even the drum had been begun.

The Florentine example* should be regarded as a precedent and inspiration throughout the whole history of St. Peter's dome. It embodied marvelous structural results, the fruit of many scores of experiments, and the concrete evidence of study of Italian examples. Bramante and Michelangelo were both familiar with this dome in detail, but each had also studied ancient Byzantine and other examples in Italy; San Gallo is even known to have had a sectional study of Hagia Sophia at Constantinople. But while Bramante was a firm adherent of the Pantheon as a particular model in this case, Michelangelo was not similarly bound, but distinctly favored Brunelleschi's results and processes. In fact, it may be said that the final result is a sort of precipitate resulting from a composition of the elements of the Pantheon and Hagia Sophia, through the medium of Italian Byzantine examples, but always with the direct influence of Brunelleschi's Florentine dome. In this connection we have the quotation referring to Florence, "Like you I will not build," and again in one of Michelangelo's sonnets, "I shall surely make thy sister larger but not more beautiful than thou."

The desire for height and exterior impressiveness prompted Bramante to raise his proposed dome upon a peristylar drum set high on a base which, although corresponding to the circular wall of the Pantheon, did not offer the same structural advantages, because of its lighter construction and its elevation, the latter being such as to reduce measurably the effectiveness of his abutments for the dome in the body of the building and probably to make cinctures imperative in the dome itself if this were to retain its semicircular section. He returned to his prototype, however, in the stepped circular buttressing mass on the lower haunch of the dome, but set the spring of the latter considerably higher in the edifice, although much below the top of the drum, which in turn he allowed to rest directly upon the pendentives. Some dimensions might be noted in this connection. Allowing for later efforts to counteract weakening, the piers of Bramante forming the main support are giant shafts of masonry, trapezoidal in plan, measuring about 61 feet in their greatest width and 39 feet on the shorter sides, thus achieving a perimeter — with due allowance for projections of about 285 feet — providing an area of support capable of bearing six and three-quarter thousand tons, and giving, despite their uncertain history, a splendid effect of structural stability. The form of the piers gives the pendentives a direct bearing and permits a slight projection beyond the inner pier face.

Michelangelo's avowed approval of Bramante's work seems, however, to have been insufficient to lead him to execute it unaltered. In fact, we are driven to the conclusion that he considered the dome of Bramante a risky undertaking, since his piers and arches had already given such a poor account of themselves, and any strengthening of these by means of additional masonry applied as a cloak to their exterior to carry the enormous weight of the solid dome would gain for them a further



Dome of St. Peter's, Rome. Section showing shells and location of original cinctures, at left Half section showing location of chains added to correct ruptures in 1743 1748, at right
(*From Durm*)

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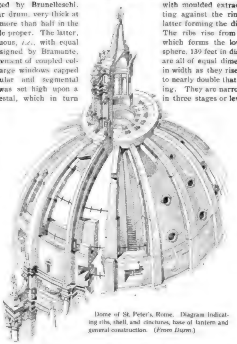
* The Dome of S. Maria del Fiore, Florence, is discussed and illustrated in detail in THE BRICKBUILDER for August, 1916, pp. 209-215.

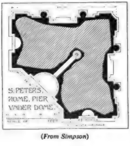
supporting strength in inferior ratio to the material added, besides destroying the effectiveness of the original design. Michelangelo therefore devised a different structural system, whose precedent it is not difficult to discern, abandoning the Pantheon suggestion, using a more pointed section, and basing the whole upon the shell type of construction elaborated by Brunelleschi. He retained the peristylar drum, very thick at its base, but reduced by more than half in the entablature of the peristyle proper. The latter, instead of being continuous, *i.e.*, with equal intercolumniations as designed by Bramante, he planned as an arrangement of coupled columns alternating with large windows capped with alternately triangular and segmental pediments. The order was set high upon a continuous circular pedestal, which in turn rested upon a flat octagon whose base was level with the roof line and bore directly upon the pendentives. Above the peristyle appeared a heavy attic with inverted consoles leading its frontal plane back to the actual circle of the dome. The coupled columns represented the ends of a series of sixteen radiating buttressing walls, the attic story broken out above, each leading the eye upward to the sixteen strongly projecting and thoroughly well profiled ribs forming the skeleton of the cupola.



Dome of St. Peter's, Rome. Diagram indicating ribs, shell, and cinctures, base of lantern and general construction. (*From Durm.*)

In Michelangelo's lifetime the work was completed to the dome springing only, the dome itself and the graceful lantern were executed posthumously, but closely followed his design, the inverted consoles above the attic having been omitted. It is noteworthy that the detailed model left by Michelangelo comprised a system of three shells,—two arranged as in the finished building, the third shell being of semicircular section with large oculus in its crown and having nothing to do with the structural work of the fabric beyond helping to counteract by its weight the lateral thrust of the other shells and providing heavier masonry at their spring. It demonstrated his sanction of Bramante's inspiration from the Pantheon for interior effectiveness — a quality which he had found lacking in the Florence cathedral. This inner shell was not executed, and since the model was completed at least six years before Michelangelo's death, it has been surmised that at the last he himself may have decided upon its elimination. Della Porta and Fontana later gave the dome an even more pointed section.

As completed, the dome consists of a framework of sixteen ribs of solid Tivoli stone projecting from the vault with moulded extrados or summits and abutting against the rim of an oculus above, the latter forming the direct base for the lantern. The ribs rise from the solid mass of brick which forms the lower quarter of the hemisphere, 139 feet in diameter at its spring; they are all of equal dimensions, are much reduced in width as they rise, but in thickness increase to nearly double that of the wall at the springing. They are narrowed, as they rise upward, in three stages or levels. There are no bonding courses of any kind between them, but they extend through the full thickness of both shells, which are not concentric as in Florence. Passages are contrived by cutting steps in the extrados of the inner shell, and a circular passage is also arranged for beneath the lantern base between the shells, using the back of the inner one as a floor. Both shells are of brick laid in herringbone fashion, the void between them being lighted by three rows of loopholes. The total height of the structure is 435 feet. The lantern has almost the same dimensions as Brunelleschi's, but is of much heavier materials and is supported on a vault of slighter section, the rim diameter being also somewhat less. Buttresses and windows in the lantern, which has also been designed upon a sixteen-sided plan, correspond to those in the peristyle.



(From Simpson)

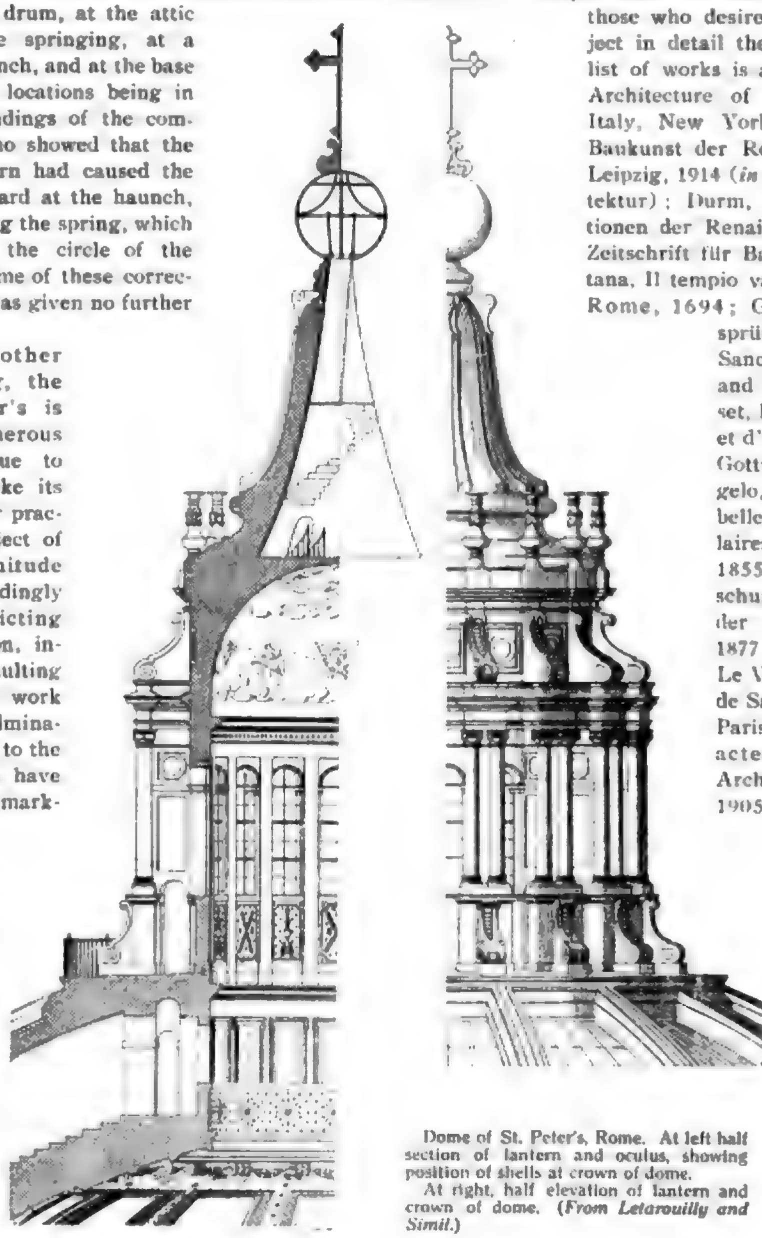
Michelangelo's structural system — however true or false his dome may be according to those who insist upon absolute structural integrity and the full and frank outward expression of all structural expedients — evidently did not stand the test of time, for it showed signs of cracking in drum and dome alike shortly after his death. No little of this damage may have been due, to be sure, to the fact that the whole of the dome was completed under Michelangelo's successors within a period of twenty-two months — a decided contrast to earlier

tardiness — and the magnitude of the undertaking is seen in that eight hundred men were employed about the work during this space of time, and these often worked at night. In such haste inferior materials crept into the construction and these brought about unequal consolidation of the mass. The defects were at first ignored and glossed over by papal request in a treatise by Fontana. In 1742-47, however, greater danger impended, and an investigation by the three foremost mathematicians of Europe at the time brought serious ruptures to light. Poleni then made a detailed study on the basis of which Vanvitelli was instructed to insert in the dome five cincture chains. Two had been built into the solid masonry at the dome springing, and at one-half its altitude; being embedded in the construction, it was not possible to ascertain if they, too, had given way. The new chains were placed respectively at the base of the drum, at the attic level, at the dome springing, at a point above the haunch, and at the base of the lantern, the locations being in accord with the findings of the committee of three, who showed that the weight of the lantern had caused the ribs to buckle outward at the haunch, thus directly affecting the spring, which in turn disrupted the circle of the drum. Since the time of these corrections the structure has given no further trouble.*

Like many another large undertaking, the dome of St. Peter's is fraught with numerous indications of value to those who now make its study a part of their practice. It was a project of stupendous magnitude and was correspondingly shackled by conflicting intentions, indecision, incapability, and vaulting ambition. In the work as it stands — its culmination was announced to the world in 1647 — we have perhaps the most remarkable example of the conglomerate result of the work of many great men that the Renaissance has to show. In that measure, at least, it is a splendid masterpiece and as such cannot be passed over because of the alleged incompatibility of abstract beauty and inconsistent internal anatomy, or because of "lack of organic unity," or dismissed with the words "out of scale." It may be safely regarded as great enough to have its own scale, which it should be the part of our humble ineptitude to study for what there is in it.

(The next paper in this series will appear in the November issue and consider St. Paul's, London.)

Bibliographic Note. It should be borne in mind that within the brief compass of these pages it is not possible or feasible to consider various controversies as to structural methods or attribution of designs, which invariably arise in regard to so important a building, or even in connection with its major mass, the dome. For the benefit of those who desire to consider the subject in detail the following suggested list of works is appended: Anderson, Architecture of the Renaissance in Italy, New York, 1901; Durm, Die Baukunst der Renaissance in Italien, Leipzig, 1914 (*in* Handbuch der Architektur); Durm, Zwei Grossconstructionen der Renaissance in Italien (*in* Zeitschrift für Bauwesen, 1887); Fontana, Il tempio vaticano e sua origine, Rome, 1694; Geymüller, Die ursprüngliche Entwürfe für Sanct Peter in Rom, Wien and Paris, 1875-80; Gosset, Les Coupoles d'Orient et d'Occident, Paris, 1889; Gotti, Vita di Michelangelo, Firenze, 1876; Isabelle, Les Édifices circulaires et les Domes, Paris, 1855; Jovanovits, Forschungen über den Bau der Peterskirche, Wien, 1877; Letarouilly & Simil, Le Vatican et la Basilique de Saint Pierre de Rome, Paris, 1882; Moore, Character of Renaissance Architecture, New York, 1905; Poleni, Memorie istoriche della gran cupola del tempio Vaticano, Padua, 1748; Simpson, History of Architectural Development, vol. 3, New York, 1911; Symonds, Life of Michelangelo, London, 1899; Vasari, Le vite de più eccellenti pittori, scultori e architetti, many editions.



Dome of St. Peter's, Rome. At left half section of lantern and oculus, showing position of shells at crown of dome.
At right, half elevation of lantern and crown of dome. (*From Letarouilly and Simil.*)

*With the exception that a sixth chain was inserted in 1748 between the second and fourth mentioned above.

Main Entrance to Pennsylvania Railway Station, New York City. McKim, Mead & White, Architects

"From Twenty-Third Street Up."

THE ARCHITECTURAL DEVELOPMENT OF FIFTH AVENUE AND INTERSECTING STREETS IN NEW YORK CITY.

By AYMAR EMBURY II.

THERE has probably never been in the course of the history of any city a more interesting and radical development and change than that which has taken place from 23d street up, in New York, during the past ten years. It is possible that the monumental improvements effected in Paris by Baron Hausmann are, in their cost and in their far-reaching effect upon the character of localities, comparable to the change which has taken place in New York; but the causes and purposes of the two changes were in all respects different, and the results are very unlike. There has been in New York no re-location of streets, no opening of new streets, and little essential change in the transportation problem to account for the enormous transformation which has taken place in the two miles from 23d street to Central Park; nor has there been any extraordinary increase in the number of businesses, or in the nature of the businesses which the city is housing. The reasons for the change are therefore obscure and difficult to isolate, so that they may be recognized as reasons.

Let us, in the first place, review briefly the progress of construction and the character of the businesses which are housed in new buildings in New York at this time and in the district which we are considering. Fifteen years ago, perhaps even ten years ago, the manufacturing districts of New York's largest industry, the making of ready-made clothing for men and women, were scattered about the lower East Side, the warehouses for dry goods of all descriptions were in the side streets opening off Broadway immediately north of the City Hall, and there were solid blocks of buildings in Wooster street, Leonard street, Murray street, and Worth street devoted to the storage and wholesale distribution of woolen goods, knit goods, silks, and the like. The great retail shopping district was to the south of the center of 23d street, curiously enough the south side of 23d street being alone utilized by the department stores, and the few blocks between 14th and 23d streets and Broadway and Sixth avenue included all the great department stores, — Arnold Constable, Lord & Taylor, and Aitken on Broadway, in the neighborhood of 18th street; Macy's, Siegel-Cooper, O'Neill-Adams & Company, and Altman & Company on Sixth avenue, below 23d street; and Stern Brothers, Le Boutillier, and other smaller stores on the south side of 23d street itself. Every one of these stores has since changed its location, with the single exception of the Siegel-Cooper Company. The other store buildings are either idle or are partially filled with manufacturing industries.

The theaters at that time were practically all below 34th street, and the one new element of business, the smart, small shop, had not yet developed into its present prominence.

The first part of the district above 23d street, in which a definite change occurred, was in the neighborhood of Fourth avenue. The dry goods trade moved practically *en masse* from lower Broadway to Fourth avenue, between

20th and 34th streets, and to the side streets immediately adjacent to Fourth avenue, partially invading Madison square and Madison avenue, once one of the pleasantest residence streets of New York. The buildings in which the woolen trade was housed under former conditions were old four or five-story stone buildings, usually built on lots of 25 feet frontage, and where a business expanded, openings were cut from one building to another to take care of the increase. In the new district practically no buildings were built with less than 40 feet frontage, and probably the great majority of all the buildings run from 40 to 60 feet in width and from 10 to 14 stories in height. The expansion in business is now provided for by increase in the space occupied vertically instead of horizontally. Many of these new buildings are of considerable architectural interest, and since their designers have had time to see the results of the first experiments, the office and loft buildings of steel construction have settled down more or less into two separate types so far as façade treatment is concerned: one type derived from Classic architecture, and the other from Gothic work, in which the vertical motives have been utilized to encase the columns, with a pseudo-Gothic treatment of detail. The number of good buildings of both types is quite amazing, and the few which have been selected to illustrate this article, while sufficiently typical of them all, were not chosen because they were the best, but because they were both good and typical.


Irving Press Building, East 31st Street

The building at 103 Madison avenue and the Burton Building at Fifth avenue and 29th street are both designed with classic motives and are buildings for the dry goods trade, the Burton Building housing a single business and its employees, while the building at 103 Madison avenue is let out in separate floors. The Crompton Building at 31 East 31st street is, on the other hand, treated with some reminiscence of Gothic detail; but solid block fronts on Lexington, Fourth, and Madison avenues, as well as on the side streets between them, repeat variations of these motives in a greater or lesser degree of excellence.

Occasionally residences have been remodeled into business buildings for those people who prefer to have some individuality about the space which they occupy, and here and there we find one of them, temporarily at least, surviving the invasion of loft buildings in a way which leads us to hope that more of the old construction may be similarly managed. The Irving Press Building, in East 31st street, is an excellent example of such treatment of an old residence, but it is one of the few surviving, and even the lovely building for the Colony Club


Crompton Building, East 31st St.
Wallis & Goodwillie, Architects


Burton Building, 267 Fifth Avenue
Starrett & Van Vleck, Architects


Apartment House, Lexington Ave.
P. C. Hunter, Architect

now lies vacant and desolate, awaiting the time when it may be removed to give place to a stark, uncompromising business structure.

Loft Building, 103 Madison Avenue
Sommerfeld & Steckler, Architects

The second phase of the development in the district, and one which has been without any real reason, so far as can be seen, is the development of the loft building for manufacturing purposes in the square enclosed by Fifth and Seventh avenues and 23d and 36th streets. The manufacture of clothing was for many years confined to the districts bordering the lower East Side, where the conditions existing were perhaps neither sanitary nor proper for the work people, but the location was accessible to their homes, as well as on cheap land in a district not already occupied by other industries. Just why the manufacturing loft buildings should have sprung up in such numbers in the district they now occupy is incomprehensible; land was not particularly cheap, transportation facilities to the lower East Side are very poor, and the district was already occupied by retail businesses of fairly high class. Now these streets from Fifth to Seventh avenues are pretty solidly built up with ten and twelve-story loft buildings, which at noon and at night pour many thousands of workers into the surrounding streets. These people have little purchasing power for the shops which they necessarily pass, the crowd is so dense and at times so unpleasant as to destroy the custom of these shops, which therefore have been compelled to move, and being compelled naturally gravitated to districts "on the avenue," beginning shortly above 23d street and continuing by degrees to 59th street. About the first of the big specialized shops to move were the jewelry houses of Tiffany & Company and The Gorham Company, whose present familiar buildings face each other diagonally across Fifth avenue at 36th street. Following them came a host of smaller shops, for many of which extremely attractive small buildings were built, such buildings as those occupied by Costikyan & Company and Schanz at 12 and 14 East 40th street, respectively; by Huber & Company at 13 East 40th street; a little building at 13 West 38th street; Hardman-Peck's Building at 433 Fifth avenue; the Jaeckel Building, 384 Fifth avenue; the Edison Building, 473 Fifth avenue, and many others

Hardman-Peck Building
433 Fifth Avenue
Harry Allen Jacobs, Architect

Architects' Building, 101 Park Avenue
Ewing & Chappell and La Farge & Morris
Associated Architects

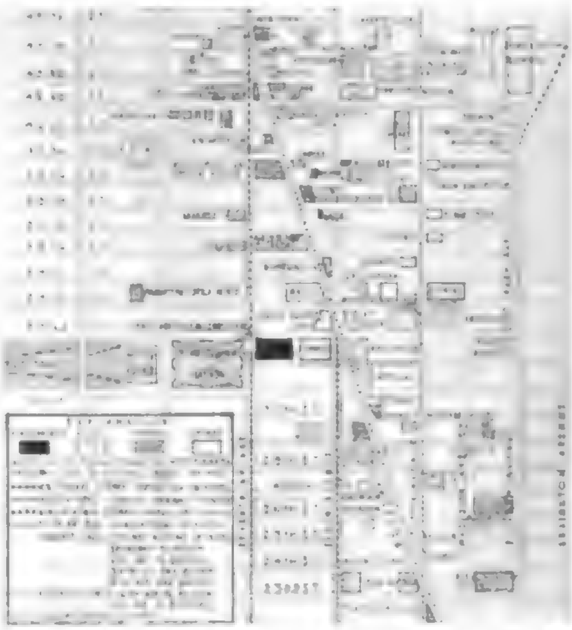
H. F. Huber Building
13 East 40th Street
J. H. Freedlander, Architect

of equal architectural merit and of equal importance as retail houses.

Besides these, certain other shops which had small beginnings have gradually grown into large businesses, so that Fifth avenue between 23d and 59th streets is now, perhaps, the most interesting and the most gorgeous shopping district in the world. The tendency has been to treat these buildings with a constantly diminishing area of show window, and to beautify these show windows as much as possible, so that the windows along Fifth avenue are in many cases color compositions of as great merit as very many pictures. Lord & Taylor's, indeed, has not hesitated to make the background of their show windows of very delightful mural decorations by Arthur Covey — an experiment which is thus far unique, but certainly worth imitation. The shopkeepers, in general, seem to realize that it is almost impossible to show enough of their goods in their windows to explain very fully the purposes of their shops, and they have endeavored to impress the buying public of the character of their shops by the architecture and general artistic handling of the building, using that as an index or expression of purpose of the goods within. This has definitely caused builders of the new shop buildings to seek out good architects and good designs, so that the shop architects of New York have received an impetus apparent nowhere else in the world, and which is bound to carry shop design very far.

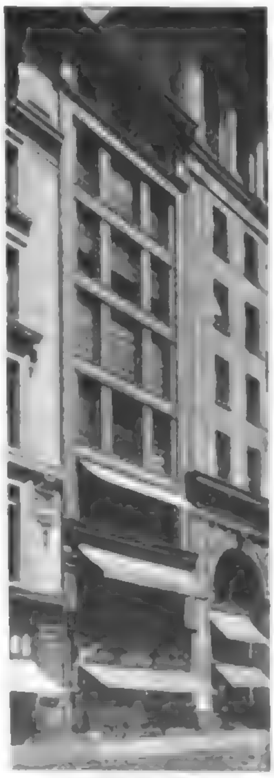
Before the steady influx of business into the district from 23d to 42d streets, the other activities have necessarily retired; lower Fifth avenue used to be a considerable club district; to-day it has none but the Union League Club left, although West 40th street facing on Bryant Park has afforded a place of refuge perhaps only temporarily, for a number of these organizations including the Engineers' Club, the Republican Club, and the New York Club. Opposite the Union League Club remains a handsome old red brick and brown stone house, 442 Fifth avenue, which is one of the few

Old Residence, 442 Fifth Avenue



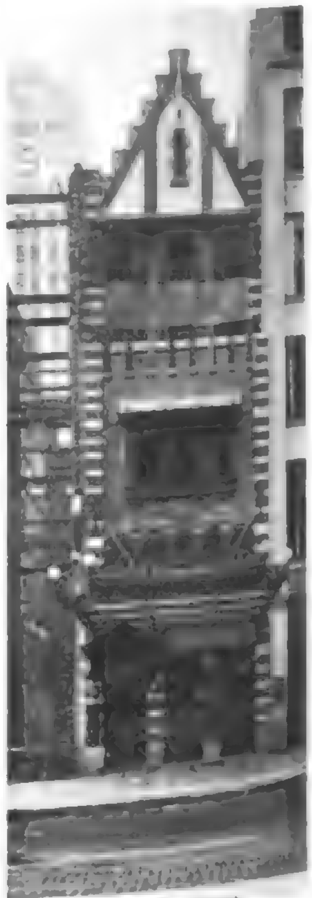
Map of New York, "From Twenty-Third Street Up"

The Edison Building
413 Fifth Avenue
Shape & Brady, Architects



Jaeckel Building
384 Fifth Avenue
McKim, Mead & White, Architects

Loft Building
13 West 38th Street
E. W. Nast, Architect



Daly's Restaurant
20 East 42d Street
John Ph. Voelker, Architect

surviving residences in the lower district. This building has a rather interesting little story connected with it: it was the home of one of the wealthiest men in New York, a man who controlled an enormous amount of property and whose office door bore the sign, "No real estate for sale." For very many years he had lived at the corner of 39th street and Fifth avenue with a vacant lot on either side, and it is said that he refused enormous sums for these pieces of property because he wanted a place for his dog to run. Aside from the story, the house is in itself interesting to the architect because it is a survivor of the brown stone era, which we are all accustomed to condemn wholesale and without much thought on the subject. There were, as a matter of fact, a very large number of houses of excellent design built in New York in this brown stone era, which was after all a period when the Italian was the source from which most of the architects drew their inspiration, just as to-day in their city work they are looking to the Italian precedent, and it is very doubtful if much of the Italianesque work of the present time is better in proportion, in handling of detail, or in choice of material than were the old brown stone, or brown stone and red brick houses, of which 442 Fifth avenue is but a single example.


Schanz Building at Left, Buchman & Fox, Architects; Costikyan Building at Right, Mann & MacNeille, Architects


Lord & Taylor Building, Fifth Avenue
Starrett & Van Vleck, Architects

The residence district, too, has largely moved north of 42d street; in fact, south of 59th street there are but few new residences (whether single houses or apartment houses) being built, and in the lower district from 23d to 42d streets, there is but one large new apartment house with which the writer is familiar — that at Lexington avenue and 38th street. While the restrictions still preserve certain parts of Murray Hill in their original residential character, numerous incursions into this territory have been made by the invading army of business, and unless the re-districting scheme for the city goes through, Park and Madison avenues and their side streets will be lost to us in their traditionary form as strongholds of affluence. It is in this district that the excellent Yale & Towne Building and the Johns-Manville Building have been built; the Architects' Building is on the fringe of the district, as well as other commercial buildings, both tall and low.

Nor could the lighter side of New York's life stand the pressure of business any more than the residential. The old Tenderloin and the old theater district have moved, and it must be a favorable enthusiast on the preservation of things as they were who would not have been glad to see them go. Wallack's Theater has been torn down; Daly's Theater, Weber's Theater, and Proctor's old Fifth Avenue Theater are movie houses; the old Lyceum has been gone for ten years, and the Madison Square Theater, too. While a few new theaters have been built in the neighborhood of 42d street, notably the 39th Street Theater and Maxine Elliott's Theater, the latter, by the way, a very lovely example of theater architecture, for the most part the theatrical business now centers to the north, and the hotels have moved with the theaters, with the exception of the Waldorf-Astoria, which seems to be impregnably entrenched in its present location, and which, once the smartest and gayest of all our hotels, is now looked upon as a staid, old-fashioned sort of place, where the food and service are as good as ever, even if the decoration is no longer bright. Fortunately with the theaters and hotels have gone the dirty nest of dives which used to make Sixth avenue and 28th street hideous; and while we cannot assume that vice in New York has been lessened in amount, at least it is freshly gilded and wears a more decent expression upon its face.

Another great factor which has just begun to influence the character of the city is the location of the Pennsylvania Station at Seventh avenue and 33d street and the approaching opening of the

Hotel Pennsylvania, Seventh Avenue
McKim, Mead & White, Architects

Printing Crafts Building, Eighth Avenue
E. L. Larkin, Architect

new subway line along Seventh avenue. The erection of the Pennsylvania Railroad Station was expected to be followed by an era of reconstruction in that part of the city, and two department stores, coming from other cities, — Gimbel's and Saks', as well as Macy's, — secured locations where they expected the traffic to be most heavy; but aside from these buildings about the first fruits of regeneration in that former negro quarter have been the excellent Press Crafts Building at the corner of 34th street and Eighth avenue, and the new hotel, now just begun, fronting the Pennsylvania Station on Seventh avenue. It would seem, however, as if the district between Seventh avenue and Fifth avenue, thus bounded by currents of travel of high quality, would eventually become New York's most important business district unless some movement as irrational and unforeseen as that which has caused the building up of this district causes its decline. It is to prevent such a movement that the re-districting scheme above mentioned has been proposed, and the city, as a whole, is earnestly hoping for its adoption. This scheme roughly proposes that the whole city be divided into zones or districts which may be restricted for residence purposes, or for business purposes, or for manufacturing purposes; and while it is proposed that residences and offices may continue in business districts, it is intended to permit no manufacturing in business districts, and no business or manufacturing in residence districts. This would stabilize real estate values to an extent which has been hitherto unknown, so that while the opportunity to amass great fortunes through acquiring property to be held until the city grows up to it will be much lessened, at the same time there will be no such loss as that which occurred on 23d street and on lower Broadway, where enormous sections of property, once both valuable and remunerative, now lie idle and a burden to their owners. The law will not disturb existing conditions, but the movement fostered by retail merchants and known as "Saving New York" has already secured one benefit — the removal of small manufacturers from the streets adjacent to upper Fifth avenue.

Office Building, 8 West 40th Street
Starrett & Van Vleck, Architects

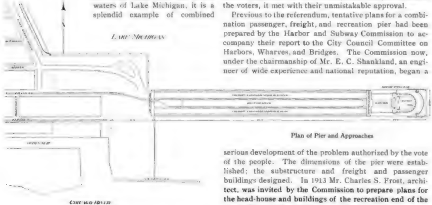
New Law Office Building, 42d Street
Jardine, Hill & Murdock, Architects

The Chicago Municipal Pier.

CHARLES S. FROST, ARCHITECT.

By IRA W. HOOVER.

At the foot of Grand avenue and terminating the recent extension of Lake Shore Drive is located the new Municipal Pier, Chicago's latest contribution to the social and economic welfare of its citizens. As seen from the Drive, extending out in a low-lying mass into the green waters of Lake Michigan, it is a splendid example of combined civic utility and popular recreation. Its purpose is primarily utilitarian, and federal authority for its construction, as the initial development of "Outer Harbor District No. 1," was obtained on that basis; the recreational features being, so far as the government was concerned, entirely unofficial.



Plan of Pier and Approaches

The port of Chicago, handling over 2,000,000 passengers annually, has been for years lamentably behind the times in its dockage facilities for passenger and package freight carrying boats, and the pier was designed to overcome the necessity for large steamers of these classes entering the narrow Chicago River, thus avoiding bridge delays to vessel interests, street vehicles, and pedestrians alike. The promised relief from these conditions was a strong factor in creating public sentiment in favor of an outer harbor, and when, in the spring of 1912, a bond issue of $5,000,000 for its development was placed before the voters, it met with their unmistakable approval.

Previous to the referendum, tentative plans for a combination passenger, freight, and recreation pier had been prepared by the Harbor and Subway Commission to accompany their report to the City Council Committee on Harbors, Wharves, and Bridges. The Commission now, under the chairmanship of Mr. E. C. Shankland, an engineer of wide experience and national reputation, began a serious development of the problem authorized by the vote of the people. The dimensions of the pier were established; the substructure and freight and passenger buildings designed. In 1913 Mr. Charles S. Frost, architect, was invited by the Commission to prepare plans for the head-house and buildings of the recreation end of the pier. So much for the history of the undertaking.

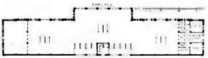
By reference to the block plan it will be seen that the pier consists of three distinct sections: the head-house, the freight and passenger building, and the recreation group, the latter including the terminal building, shelter, and concert hall.

The head-house contains the offices of the harbor master and pier officials; also utility rooms for electrical control, heating, etc. Pedestrians gain access to the pier through the head-house, ascending by broad and easy ramps to the passenger deck of the freight and passenger building, and by stairs to the board-walks above. The

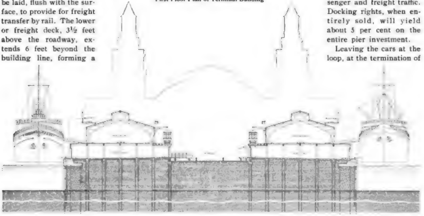
towers contain gravity tanks of 60,000 gallons capacity each, supplying the sprinkler system protecting the entire freight section.

The pier extends into the lake, beyond the head-house, a distance of 3,000 feet, having a width of 292 feet. The freight and passenger building, occupying the bulk of the structure, consists of two sections, each 2,340 feet long by 100 feet wide. A roadway, 80 feet in width, divides these sections, being used for trucking and motor access to the recreation end of the pier. As freight traffic develops, tracks will be laid, flush with the surface, to provide for freight transfer by rail. The lower or freight deck, 3½ feet above the roadway, extends 6 feet beyond the building line, forming a freight wharf having a total length of nearly 5,000 feet. The upper deck is for the exclusive use of boat passengers and pier visitors, who reach it either by the ramps before mentioned or by trolley. Cars enter the pier at this level, run to the extreme end of the freight and passenger building where they loop to the opposite side, giving equal service to both sections. Passengers are discharged at their particular steamer, which they conveniently board at the upper deck. This portion of the pier is available only to steamship lines having a combined passenger and freight traffic. Docking rights, when entirely sold, will yield about 5 per cent on the entire pier investment.

Leaving the cars at the loop, at the termination of



First Floor Plan of Terminal Building



Cross Section Through Freight and Passenger Portion of Pier

View from Head-House Looking Down Roadway to Terminal Building

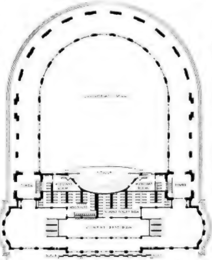
the freight and passenger building, we enter the terminal building, the first unit of the recreation group. This section is used for general circulation, broad stairways giving easy access to the various levels. Here are located information bureaus, toilet rooms, a well appointed emergency hospital, and on the third floor a restaurant, 30 feet by 245 feet, overlooking the water on three sides and adjoining uncovered decks, making possible unlimited *al fresco* service.

The terminal building and concert hall are connected by the shelter building, 80 feet by 220 feet. In this section an effort was made to eliminate, as far as possible, all obstruction to a free circulation of air, and at the same time provide protection from sun and sudden showers. As anticipated, it has proved most popular, and it is a sultry day indeed when its cool shadows are not made more inviting by a gentle breeze.

The superstructure of the pier is terminated by the concert hall, in connection with which a section has been arranged for the comfort of the public. One floor is used as a rest room — if such a thing can be said to exist in this place outside the hospital! Another floor is occupied by a women's retiring room, musicians' rooms, extensive toilets, etc. The concert hall proper has a length of 150 feet, a clear transverse span of 138 feet, and a height of 100 feet, including the monitor. It has a seating capacity of 4,000 which is greatly increased by the open loggias encircling the hall at three levels. Flanking the concert hall are the observation towers, 165 feet in height. Balconies and open platforms at various levels give unobstructed views of the city's far-reaching shore line and, on clear days, the sand dunes of Indiana, to the eastward, 40 miles across the lake.

The promenade surrounding the recreation group descends in broad terraces, reaching at the extreme end of the pier the landing for small boats at a level but 4 feet above the water, the elevation of the pier proper being 9½ feet. All excursion steamers, boats for the north and south parks — in fact, all strictly passenger craft, both public and private, arrive and depart only from the recreation end of the pier.

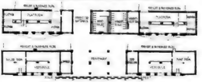
View of Passenger Deck



First Floor Plan of Concert Hall

Second Floor Plan of Front Portion of Concert Hall

Detail of Flagstaff



First and Second Floor Plans of Head-House

Detail of Pylon

In considering the methods of construction and materials used, it must be remembered that this is a vast public utility and playground, free to all comers, the mere fact of being free carrying with it a certain lack of responsibility on the part of many of the visitors. All classes, nationalities, and ages are represented in the daily thousands who gather here for recreation and relief from superheated rooms and pavements. Methods and materials were adopted to eliminate as far as possible petty vandalism. The decks and floors throughout, with the exception of the concert hall, are of concrete. Red pavers, with considerable variety of shade, are used for all exposed brick work, including high wainscoting in the principal public rooms of the head-house and recreation group. The modeled ornament used on the exterior is a more or less realistic representation of various forms of aquatic life; while the interiors, with the possible exception of the concert hall and restaurant, are devoid of decorative embellishment. Much of the structural steel is exposed, while in all cases the floor construction is undisguised.

"Big, raw, generous, crude, unfinished, mostly in the rough, yet with a practical and kindly feeling about it for its size that makes you right at home, this new municipal pier is a sort of microcosm of Chicago, if a diminutive may properly be applied to anything so impressive by its mere bulk as is this tremendous institution. It is big in idea, and this conception has been transplanted into concrete, brick, and steel with a courage of which you can form no conception save by seeing with your own eyes."

As a recreational and educational center the possibilities of this gigantic municipal enterprise are almost unlimited. While there have been many criticizable delays in awarding various much needed concessions, the pier is gradually finding itself, and has, within a few short weeks, taken a firm hold on the fancy of the people, and awakened the civic sense of many thousands. Free orchestral, vocal, and band concerts, arranged by the Civic Music Association, have met with a most hearty response by the public, as evidenced by capacity attendance. Having in mind the very successfully operated municipal dance halls of the previous administration, the Commission assumed that the concert hall would at times be used for that purpose, and to this end the floor was specially constructed for dancing. In spite of public clamor, however, this form of diversion has not up to the present prevailed. Tentative plans for the season of 1917 are already under way and in addition to more and better concerts, illustrated lectures by the Health Department are proposed. It has even been suggested that undenominational church services be held on Sunday mornings.

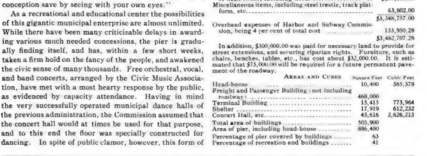
This digression will perhaps be excused for the attention it may call to the potential possibilities of the pier as a physical, educational, and moral influence in the community.

Following is a condensed tabulation of costs, areas, cubes, etc.:

Contracts			Totals
HEAD-HOUSE			
Building	$121,757.00		
Electric	10,000.00		
Plumbing	8,500.00		
Steam Heating	4,060.00	$144,317.00	
Sub-structure		7,994.00	$152,311.00
FREIGHT AND PASSENGER BUILDING			
Building	$1,090,292.00		
Electric	108,000.00		
Plumbing	57,962.00		
Sprinkler System	99,405.00	$1,355,659.00	
Sub-structure		$614,649.00	$1,970,308.00
RECREATION BUILDINGS			
Building	$539,556.00		
Electric	72,000.00		
Plumbing	29,900.00	$641,456.00	
Sub-structure		223,190.00	$864,646.00
Total cost of buildings			$2,987,265.00
To which should be added:			
Filling 20.7 acres of land for approach and park east of head-house, including docks			$297,690.00
Miscellaneous items, including steel trestle, track platform, etc.			63,802.00
			$3,348,757.00
Overhead expenses of Harbor and Subway Commission, being 4 per cent of total cost			133,950.28
			$3,482,707.28

In addition, $300,000.00 was paid for necessary land to provide for street extensions, and securing riparian rights. Furniture, such as chairs, benches, tables, etc., has cost about $32,000.00. It is estimated that $75,000.00 will be required for a future permanent pavement of the roadway.

AREAS AND CUBES	Square Feet	Cubic Feet
Head-house	10,400	585,578
Freight and Passenger Building (not including roadway)	468,000	
Terminal Building	15,415	773,964
Shelter	17,919	612,232
Concert Hall, etc.	45,616	2,626,213
Total area of buildings	505,900	
Area of pier, including head-house	886,400	
Percentage of pier covered by buildings	63	
Percentage of recreation end buildings	41	



View of Recreation End of Pier from Lake Michigan

GENERAL VIEW OF HEAD HOUSE AND FREIGHT AND PASSENGER BUILDING

VIEW OF CONCERT HALL FROM END OF PIER

MUNICIPAL PIER, CHICAGO, ILL.
CHARLES S. FROST, ARCHITECT

VIEW OF SHELTER AND CONCERT HALL FROM TERMINAL BUILDING

INTERIOR VIEW OF CONCERT HALL

MUNICIPAL PIER, CHICAGO, ILL.

CHARLES S. FROST, ARCHITECT

GENERAL VIEW OF LOBBY LOOKING TOWARD ELEVATOR HALL

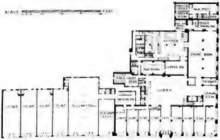
GRILL ROOM

MEN'S CAFE

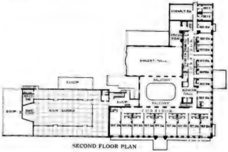
ROBERT TREAT HOTEL, NEWARK, N. J.

GUILBERT & BETELLE, ARCHITECTS

GENERAL VIEW OF EXTERIOR



FIRST FLOOR PLAN



SECOND FLOOR PLAN

BANCROFT HOTEL, SAGINAW, MICH.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

MAIN DINING ROOM

BAR ROOM

DETAIL OF MAIN ENTRANCE

BANCROFT HOTEL, SAGINAW, MICH.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

BANQUET HALL

FIRST FLOOR LOBBY

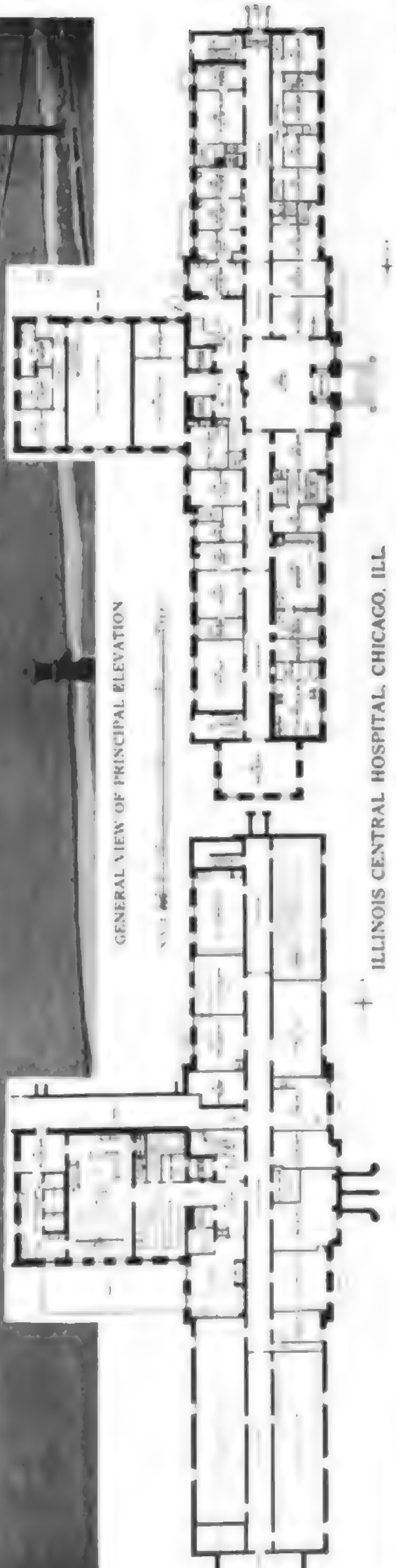
BANCROFT HOTEL, SAGINAW, MICH.
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

DETAIL OF ENTRANCE PAVILION

ILLINOIS CENTRAL HOSPITAL, CHICAGO, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

GENERAL VIEW OF PRINCIPAL ELEVATION



BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

ILLINOIS CENTRAL HOSPITAL, CHICAGO, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

VIEW OF REAR SHOWING LAUNDRY AND POWER PLANT AT RIGHT

THIRD FLOOR PLAN

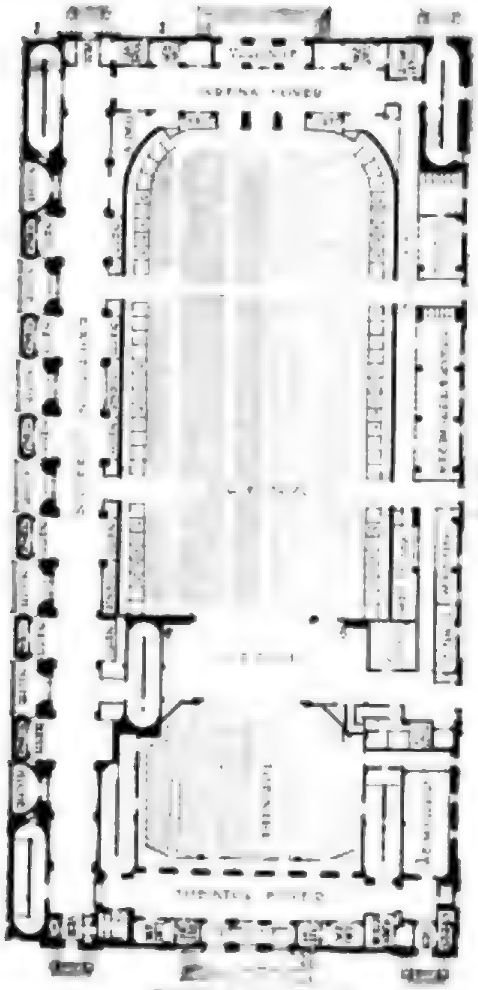
FOURTH FLOOR PLAN

VIEW OF ENTRANCE LOBBY

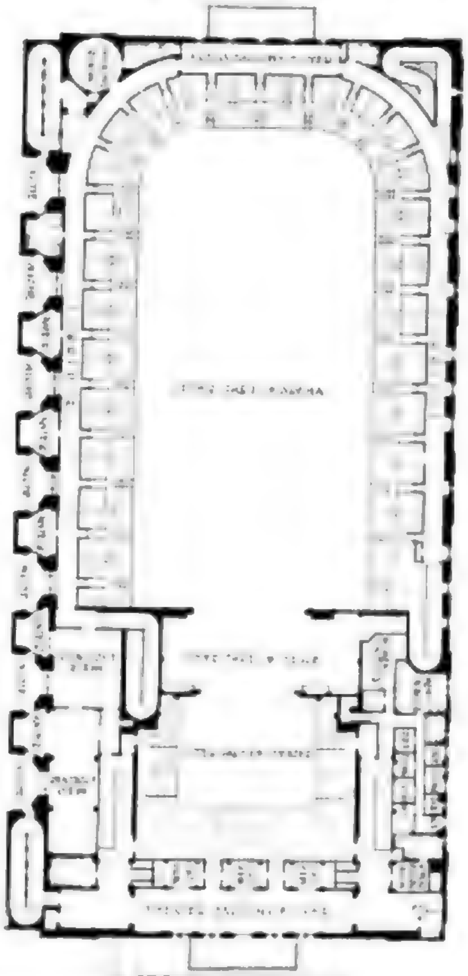
ILLINOIS CENTRAL HOSPITAL, CHICAGO, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

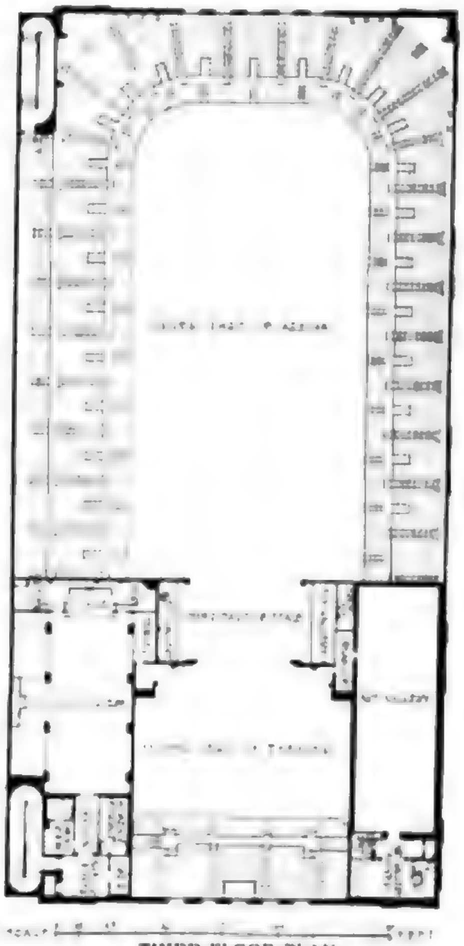
GENERAL VIEW OF NORTH AND WEST ELEVATIONS



FIRST FLOOR PLAN



SECOND FLOOR PLAN

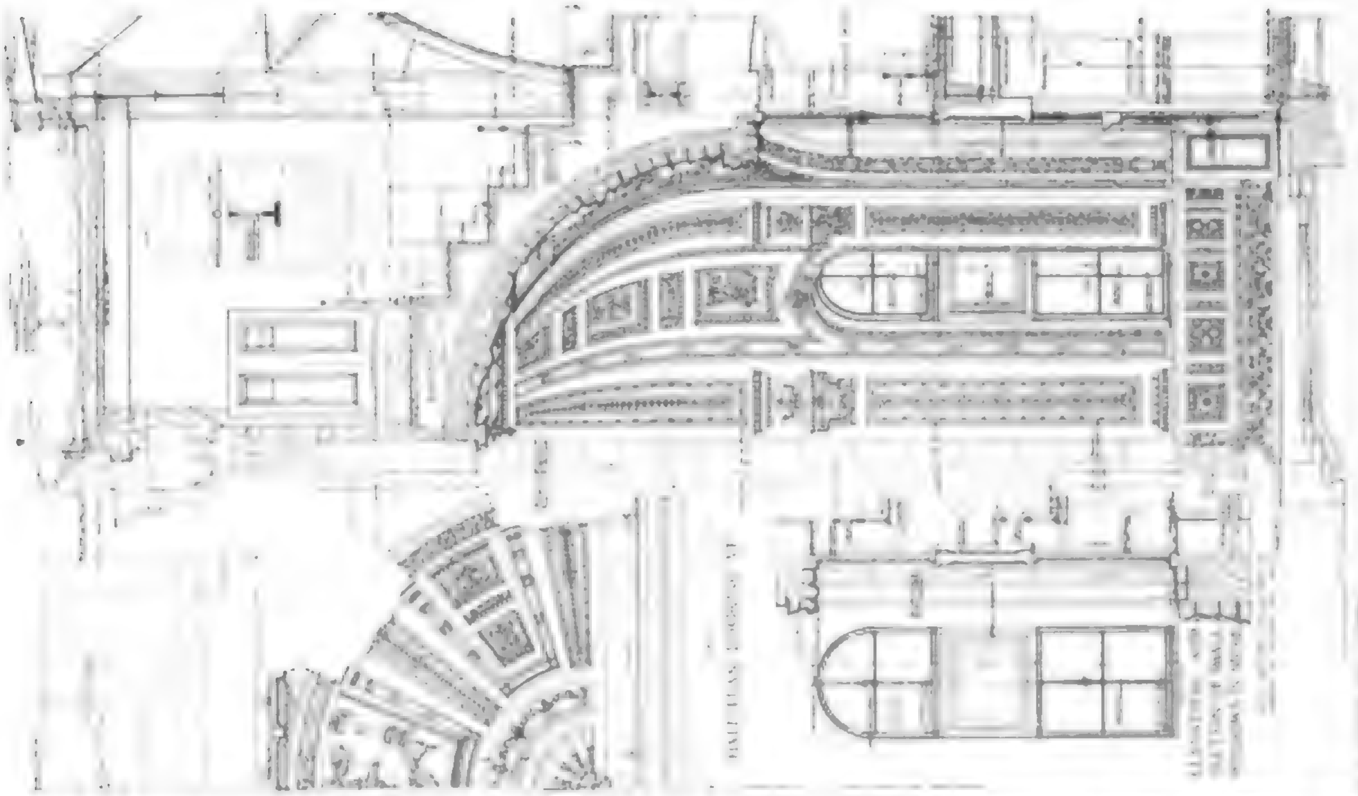


THIRD FLOOR PLAN

OAKLAND AUDITORIUM, OAKLAND, CAL.

JOHN J. DONOVAN, ARCHITECT

HENRY HORNBOSTEL, CONSULTING ARCHITECT



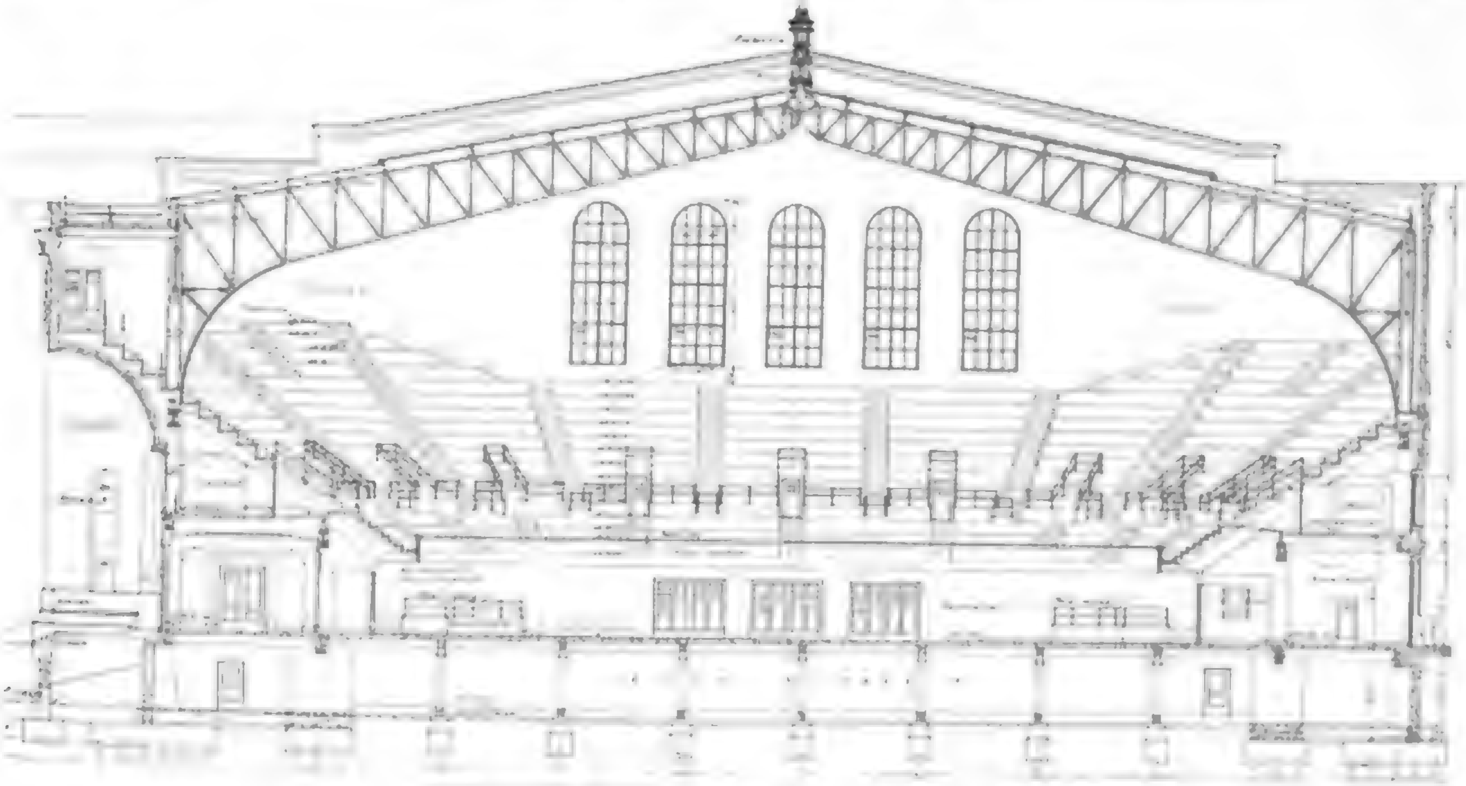
DETAILS OF NICHE AND SCULPTURAL FIGURES PORTRAYING "THE DUTIES OF LIFE"

OAKLAND AUDITORIUM, OAKLAND, CAL.

JOHN J. DONOVAN, ARCHITECT

HENRY HORNBOSTEL, CONSULTING ARCHITECT

VIEW OF ARENA LOOKING TOWARD STAGE



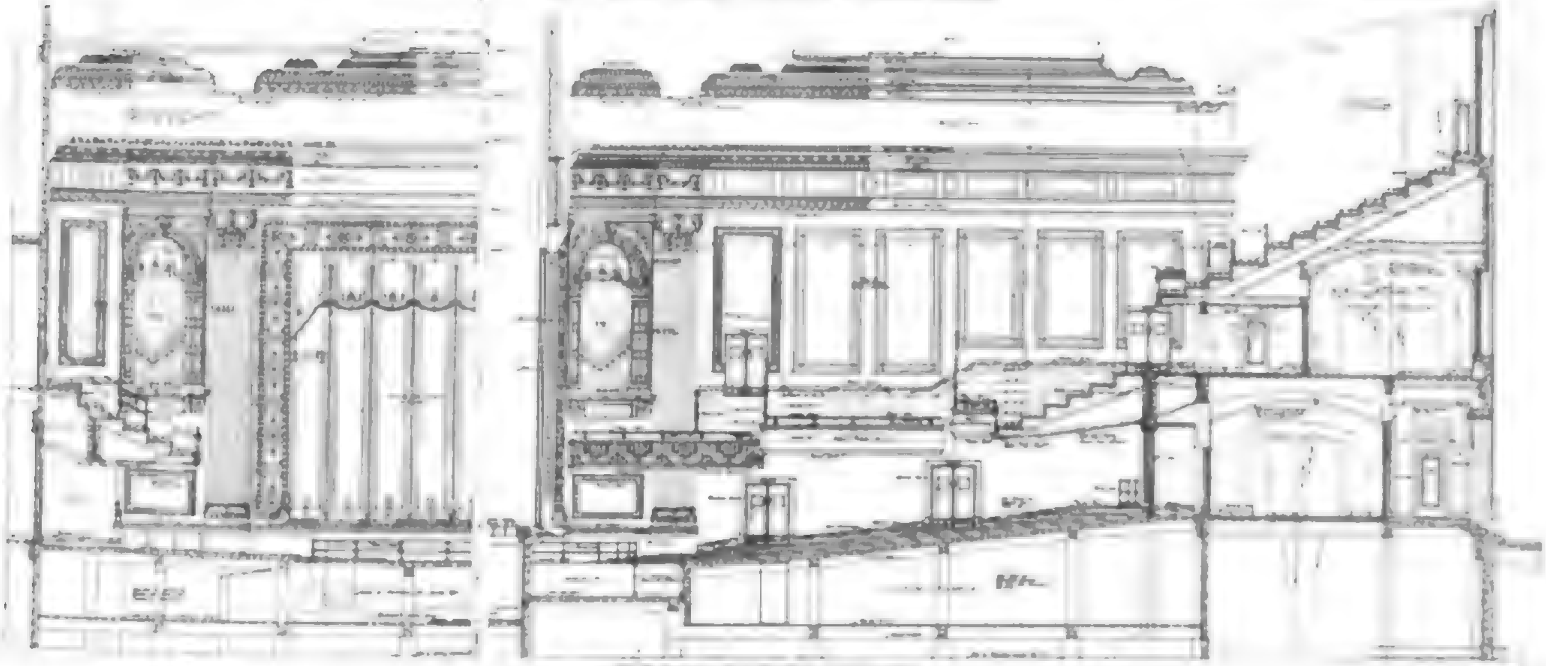
CROSS SECTION THROUGH ARENA LOOKING TOWARD REAR

OAKLAND AUDITORIUM, OAKLAND, CAL.

JOHN J. DONOVAN, ARCHITECT

HENRY HORNBOSTEL, CONSULTING ARCHITECT

VIEW OF THEATER LOOKING TOWARD STAGE



SECTIONS THROUGH THEATER

OAKLAND AUDITORIUM, OAKLAND, CAL.

JOHN J. DONOVAN, ARCHITECT

HENRY HORNBOSTEL, CONSULTING ARCHITECT


ART GALLERY


THEATER BALCONY FOYER


SMALL BANQUET ROOM


FIRST FLOOR THEATER FOYER

OAKLAND AUDITORIUM, OAKLAND, CAL.
JOHN J. DONOVAN, ARCHITECT
HENRY HORNBOSTEL, CONSULTING ARCHITECT

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS.

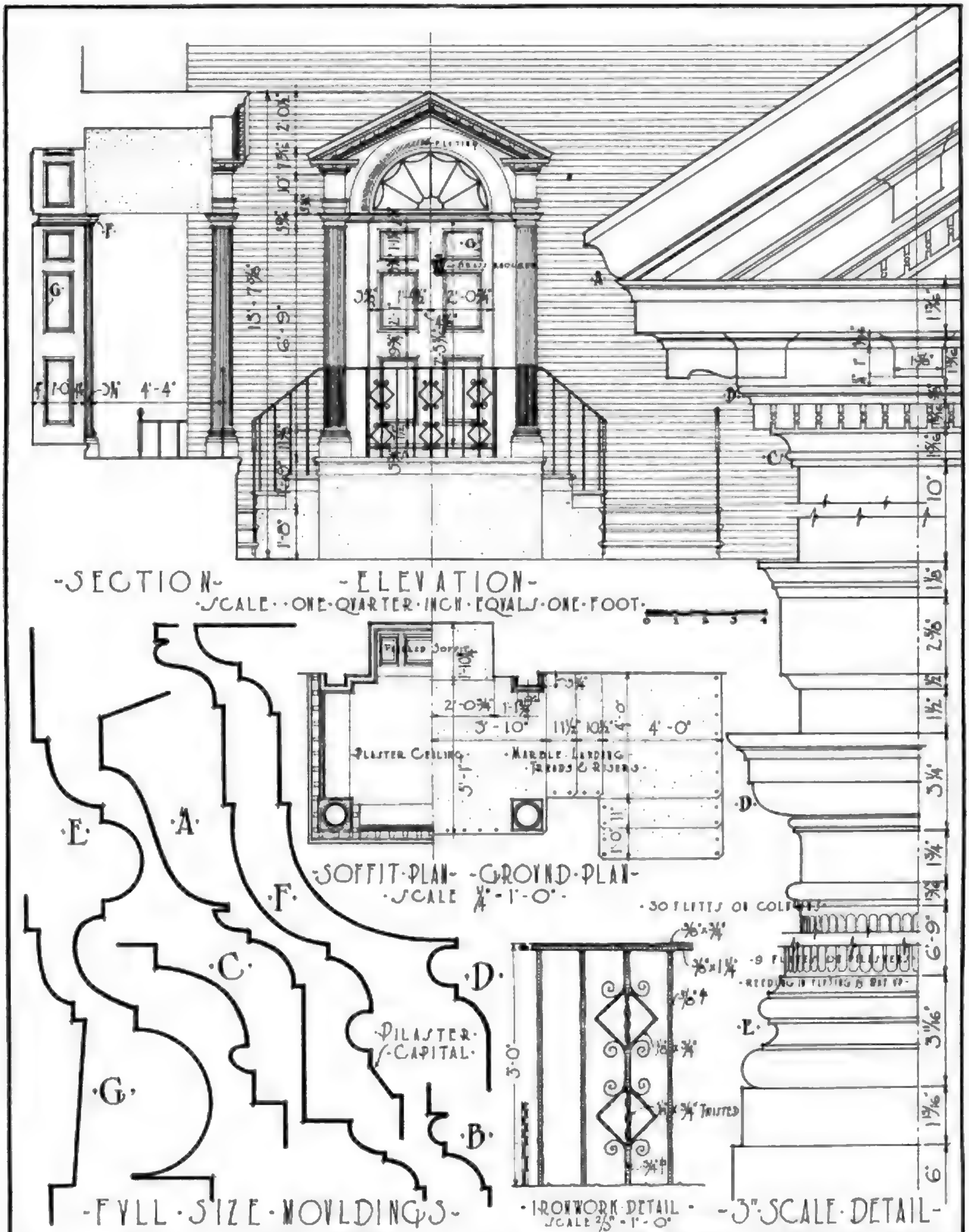
BUILT in 1791 by Moses Myers, the Barton-Myers house is perhaps the best Colonial residence to be found in Norfolk. The doorway here illustrated is typical of the Norfolk work and is a most excellent example of the Colonial style. White marble steps with a well executed wrought iron railing lead up to the entrance from either side. The delicately fluted Doric columns, with reeding extending one-third way up their height, support an entablature of characteristic Colonial mouldings.

Attention is directed to the naive treatment of the pilaster capitals where the omission of the necking and a change in the moulding contours of the capital will be noted.

PORCH AND DOORWAY OF BARTON-MYERS HOUSE, NORFOLK, VA.

Built in 1791.

MEASURED DRAWING ON FOLLOWING PAGE.



·PLATE·30·	·DOORWAY·BARTON·MYERS·HOUSE· ·NORFOLK·VA·	MEASURED·&·DRAWN ·BY·
·OCTOBER·1916·	·DATE·1791· ·BUILT·BY·MOSES·MYERS·	·J·L·KEISTER·

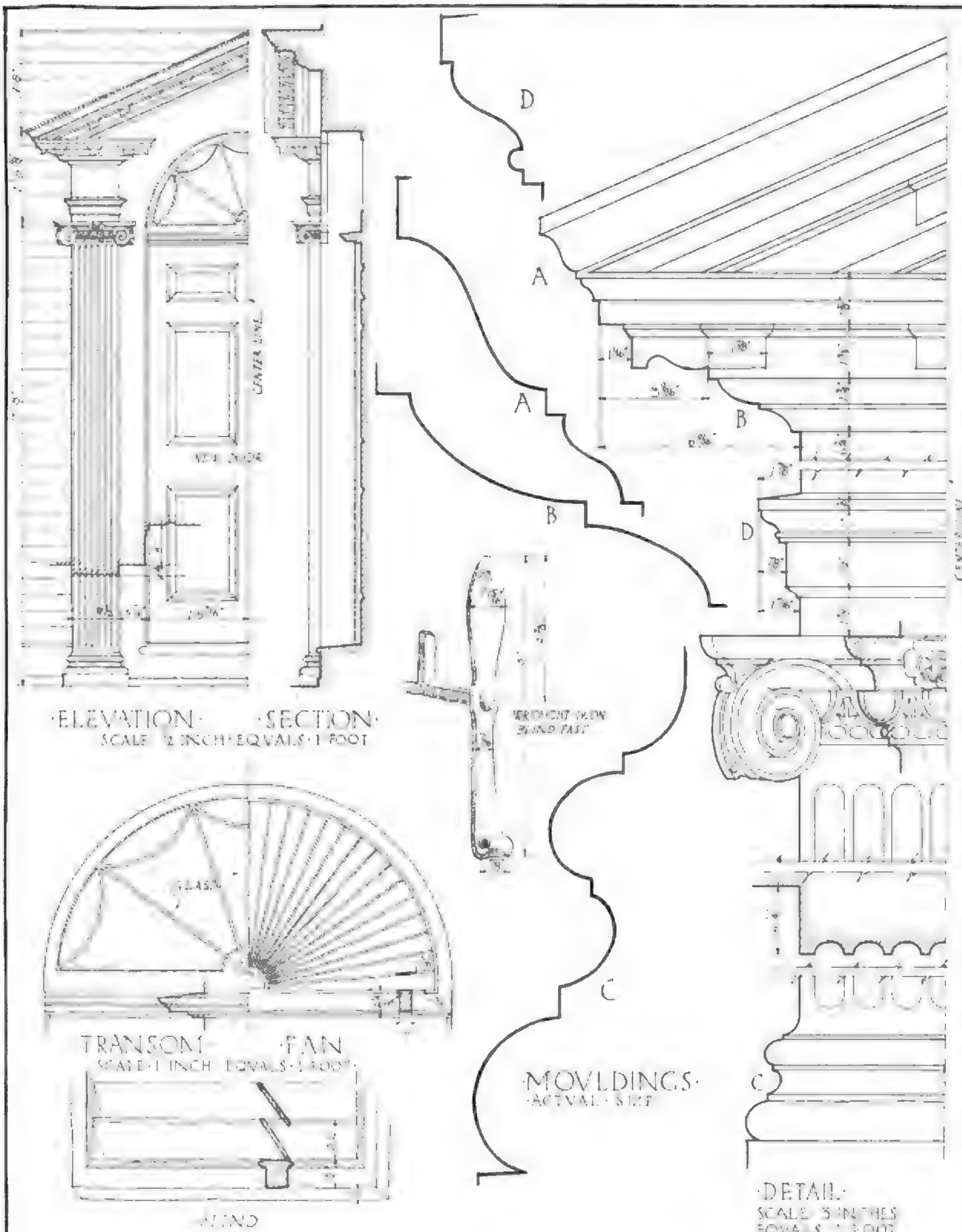


PLATE 31 OCTOBER 1916	·DOORWAY HODGES·WEBB·MEEK·HOVSE· DATE 180[illegible] SALEM MASS	MEASVRED & DRAWN BY GORDON·ROBB

DOORWAY OF HODGES-WEBB-MEEK HOUSE, SALEM, MASS.

Built in 1800.

Decorative Plaster Work.

I. THE WORK OF THE GREEKS AND ROMANS.

By A. D. F. HAMLIN.
Professor of the History of Architecture, Columbia University.

THE beginnings of the art of plastering are lost in the mists of prehistoric antiquity, but its genesis is not hard to guess. With the earliest efforts of primitive man to construct a weather-proof shelter, whether of saplings and osiers, or of sun dried brick, or of stone, he must have applied mud or clay to the interstices of his hut to close them equally against the weather and against prying eyes. When at some later period of primitive civilization he discovered the properties of limestone that had been burned by his fires and then slaked in water, he took the first step toward the evolution of a new art. The admixture of sand and of hair or straw to give it a firmer consistency led to the practice of spreading it over the whole surface of his walls, at least of his interior walls, whereby they were made smooth and white and beautiful to look upon. With the discovery of pigments that could be applied to the plaster came the beginnings of mural painting, and plastering entered into its first definite service of the fine arts.

Pompeian Stucco Reliefs in Stabian Baths

In these earliest phases of the use of plaster we note the two uses to which it was applied throughout all classical antiquity; to the covering of interior walls with a uniform plane surface; and to the coating of rough or coarse grained stone with a fine surface for exterior effect. Just how early and where the first steps were taken toward its use for modeled or relief decoration is not known; but wherever it originated — perhaps in Greece or southern Italy — this third use of the material was carried to the highest perfection by the Romans, and later revived in the Renaissance, to be developed in new directions, as will be shown in another article.

So far as actual historical examples go, the Egyptians were the first people to put lime or gypsum plaster to artistic use. As far back as in the time of the Pyramid builders, some 3500 years or more B.C., they had learned to spread a thin coat of fine gypsum plaster over the surface of their masonry, upon which to paint the pictures which formed their chief decoration, both for interiors and exteriors. This plaster was composed chiefly of gypsum or "plaster of Paris," which is a sulphate of calcium, ordinary lime being a hydrated carbonate of calcium. The outlines of the painted decorations were incised, cutting through the plaster which was never very thick. In the dry climate of Egypt there was no danger of its flaking off, as it would surely do exposed to the varying temperatures and humidity of a more northern climate. This fine plaster was also applied as a sizing to wooden objects, obliterating the grain and the joints, and offering a smooth, white surface to the painter's brush.

Whether the Chaldæans, or the Accadians and Sumerians before them, used lime or gypsum plaster earlier than the Egyptians it is impossible to know. Remains of Chaldæan plastered walls, however, have been found of an antiquity rivaling that of the Pyramid-builders, and it is highly probable that in a land in which, as in Chaldæa, clay is the only generally available building material, some means would have been found very early of covering the walls of sun-dried clay with a decorative coat. The difficulty would be the scarcity of limestone, which would have to be brought down from the high table-lands of northern Assyria, and of fuel to burn it with. Plaster, therefore, was a rare and precious material, as was encaustic tile; rugs or hangings, and alabaster slabs richly carved were quite as common. Moreover, the complete collapse of the Babylonian and Assyrian palaces, with the soaking and crumbling of their clay walls and vaults, has destroyed almost every vestige of their plastering. Enough has been found, nevertheless, to show that white plaster was in use for two or three thousand years in the Tigro-Euphrates valley as a finished surface to receive painted decoration.

Another ancient civilization which developed a remarkable art of decoration in or on plaster was that of Crete, with its Ægean branches in Troy, Mycenæ and Tiryns.

The discoveries of the last fifteen or twenty years at Knossos, Hagia Triada, and other Cretan cities and the earlier excavations of Schliemann and others at Mycenæ and Tiryns reveal the use of white plaster with painted decorations as far back as 1800 or 2000 B.C. A highly developed decorative art grew up in Crete and spread thence to Mycenæ and Tiryns. Human figures, bulls, and other subjects were represented with great naturalism and dramatic vigor of action. The composition of this early Ægean plaster I am unable to give; it was probably a lime plaster.

Hellenic Greece received the art of plastering as a tradition, either brought from the primitive Hellenic home, wherever that was, or inherited from the Mycenæan-Tirynthian culture. The Greeks developed it, as they did everything they touched, along lines of high æsthetic beauty. The first use was, as in Egypt, to cover over the rough surface of the masonry of coarse poros stone with a fine, smooth, hard coating on which color could be applied where necessary. After the general adoption of marble as the proper material for temples, the use of plaster and stucco was less common in such buildings, but it probably continued in use for houses and the lesser sort of public buildings, which were commonly of rough rubble or of sun dried bricks.

One of the most singular uses of hard plaster was for decorative floorings. Traces of this use have been found in Egypt; but the most remarkable example is that uncovered by the German explorers of Olympia in the early eighties. In the Temple of Zeus Panhellenios there was found a floor of very hard plaster, decorated in black and white with an elaborate series of panels separated by complex meander borders, and containing each a mythological grotesque or figure. This, however, remains the only example of the sort thus far discovered in Greece.

If the remains of Greek plaster work are scanty, those of Roman plaster work are very abundant and very striking. It was the Romans who exalted plaster into something more than a merely subordinate element in architectural design, and made it a medium for the most varied and splendid forms of artistic expression. This was doubtless in great measure due to Greeks in Roman employ, but it was accomplished to meet Roman requirements, under Roman direction, and to satisfy Roman taste. That the results were universally so charming, so refined, so original, and so beautiful, should go far to refute the slurs quite frequently cast on Roman art and Roman taste. Our American art is no less American because much of it has been the work of foreign artists and artisans domiciled among us; and the Roman *stuccatura* is Roman art and not Greek art, though much of it may have been wrought by Greek hands.

Stucco Reliefs from the Farnesina Gardens

Plaster decoration was an inevitable accompaniment of the Roman structural system. In Rome and throughout Italy generally, brick, rubble, and a species of coarse concrete were the chief materials for walls, and brick and concrete for vaults. Brick, terra cotta, and decorative tiles, which have been used by so many peoples, East and West in different ages, seem never to have been used by the Romans for decorative facings to their walls, either on the outside or inside. The Etruscan skill in modeling and coloring terra-cotta decorations for architecture disappeared as the use of marble increased in and after the time of Augustus, who "found Rome brick and left it marble." Marble facings and architectural details of marble were the universal dressing for exteriors of important buildings, and marble and plaster for the interiors.

The quality of the Roman plaster was excellent and much of it has endured to our own day. It was applied in several coats upon a heavy ground coat of a sort of cement mortar, made of lime, sand, and *pozzolana* — a volcanic dust or powder with strong hydraulic qualities. For very heavy work finely pounded brick was mixed with the lime. For the finishing coat various compositions were used, — sand and lime, gypsum or plaster of Paris, and lime-and-marble dust. The finished plaster was rarely left plain; it was either painted or moulded in low relief, or both moulded and painted. There has been much discussion as to processes of painting — these will be referred to later.

All students of Roman art turn to Vitruvius for information as to the classic Roman practice; for the Ten Books on Architecture of Vitruvius Pollio were a text-book and compendium of all

Stucco Reliefs from the Farnesina Gardens

the arts connected directly or indirectly with building. But it must be remembered that Vitruvius wrote in the Augustan Age, before Roman art had freed itself from dependence on Greek art; before architecture had attained its final maturity under the Flavian and Antonine emperors. We need not suppose that the rules he lays down were by any means universally observed. They were book rules, or digests of standard Greek writings on building. Yet they undoubtedly give an idea of the minute care exercised by the plasterers of Rome, both in his time and for a century or more afterward. The slaking and ripening of the lime were matters of sedulous care, as they are to this day in Italy and the Mediterranean countries. Pliny in his "Natural History" declares that no lime should be used that has not been slaked for at least three years! This rule would hardly find favor with American builders, and is doubtless an extreme requirement; but in the East to this day the lime pit is dug and the lime slaking begun while the foundations are being excavated, so that the lime may be "ripe" when the plastering is begun a year or two later. It is first slaked in shallow troughs, constantly hoed and stirred until smooth like cream, and then emptied into the adjacent pit. When the pit is nearly full, the lime is covered over with earth, often over a preliminary layer of cow-dung or other manure, and so left to ripen for months or years before using. This is undoubtedly a direct inheritance from the old Greek and Roman tradition. Vitruvius gives minute instructions for testing the lime after slaking. The final criterion is the adhesion of the lime to the metal of a hoe used like an ax; if the metal comes out clean from the lime, it is not yet tempered; "it is weak and thirsty, but when the lime is rich and properly slaked, it will adhere to the tool like glue" (Vitr., VII, 2, 2). In a later paragraph he specifies the running of the moldings first, then a "very rough rendering coat . . . and afterward, when the rendering coat gets pretty dry, spread upon it layers of sand mortar," exactly worked to plummet, rule, and square. A second and a third coat are applied, each as the preceding dries, and he insists on the necessity of care and thoroughness in these "foundation" coats. The plaster is now ready for the "mixture for the powdered marble"— he does not specify its composition. Three coats of powdered marble are applied, presumably mixed into gypsum plaster or fine lime plaster, and each is rubbed down, the last coat being the finest. The colors are applied to the plaster while still wet, that is, they are true fresco.

The limits of this article do not permit further quotations from Vitruvius; the curious reader is referred to the excellent edition of Vitruvius as translated by the late Professor Morgan of Harvard, and illustrated by Prof. H. L. Warren of the Harvard School of Architecture.

The Roman art of plaster decoration was probably derived from the Greeks; but the resemblance of much of this work, even of the first century A.D., to Etruscan terra cottas of the same period suggests that it was not by any means all of Greek workmanship. Probably the earliest examples extant are those in or from Pompeii, where painting and modeling in relief were both practised with consummate skill. Much of this work dates from the reconstruction of Pompeii after the earthquake of 63 A.D., though there is not a little, especially of painted decoration, of an earlier date. But modeling in relief seems to have become a general practice in the first century A.D., both in Rome itself and in provincial cities like Pompeii and Herculaneum. The finest Pompeian reliefs are those of the Stabian Baths, though some very delicate gilded reliefs from the Tomb of Scaurus are of earlier date. By far the richest find of work of this sort was that made in 1879, in the gardens of the Villa Farnesina, in connection with the building of a new embankment wall on the west side of the Tiber. Excavations for this wall disclosed the long-buried ruins of a house, the walls of which were covered with stucco decorated both by paintings and reliefs of a quality equal to the finest of the Pompeian walls. Large sections of this decoration were successfully removed and set up in the Museo Nazionale (Museo delle Terme) adjacent to the Baths of Diocletian, and every fragment, however small, that could be rescued was saved and is now to be seen in that museum. Casts of the reliefs were made and have been widely distributed; the Victoria and Albert (South Kensington Museum has a complete set of these;[*] there are

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[*] In Bankart's "The Art of the Plasterer" (Batsford, London; Scribner's, New York, 1909) there are many admirable prints of examples from this collection.

a few at Columbia University and in other American collections.

These "Farnesina" reliefs are gems of the modeler's art. They appear to have been worked free hand in the wet plaster — a process requiring the utmost dexterity and fine artistic feeling. The relief is very low, and the figures are modeled with surprising grace and correctness of drawing. Infant genii, swans, griffins, nymphs, Victories, and monsters figure in these decorations, most of them from a fallen vault, though some of them probably adorned panels on the walls. The painted walls are less showy but more refined in design and execution than the Pompeian walls, with little suggestion of the fantastic architecture so prominent in the later Pompeian work, and less glaring contrasts of color.

Some tombs on the Via Latina, one especially, are adorned with delicate reliefs in *stucco duro*, as the hard, finishing plaster of the Romans is called; these reliefs are set out in color and are second only to those of the Farnesina house in quality. In the finest of these tombs the barrel vault is laid out in circular medallions framed in delicate, enriched mouldings, with subordinate rectangular panels in the spaces between them. Each medallion and each panel contains a figure or group of mythological subjects, and exquisitely delicate scrolls in very low relief wander among these panels. Border compositions occupy the end walls under the vault. Another tomb has a groined vault with low reliefs in panels and end-wall decorations quite like the "Third Style" of Pompeian wall painting; it is less delicate, less charming than the tomb first described.

When Titus built his baths on the Esquiline Hill, he prepared the site by tearing down the extravagant "Golden House" of Nero and building among the piers which supported the platform and basement of that palace the piers which were to carry the new Thermæ. All these piers still exist, forming a labyrinth of brick masonry and vaulting, and all were originally covered with, and still in large measure retain, decorations in stucco of the finest quality. All this building, demolition, and rebuilding took place between 50 and 80 A.D., the golden age of Roman stucco work. These decorations in combined color and relief are of the most charming character and of the freest and most fanciful design of arabesque.

There are many other remains of Roman plaster work on the Palatine Hill, in the ruins of the Villa of Hadrian at Tivoli, in the débris of Roman villas on the Campagna, and doubtless elsewhere in Italy. This paper has done no more than call attention to a few of the most noted examples. The curious reader is referred to Bankart's work on "The Art of the Plasterer," to Volume I of the Sturgis-Frothingham "History of Architecture," to Gusman's work on Roman Decorative Art (in French), to Mau's "Pompeii," translated by Professor Kelsey, and to other works to be found in the Avery at Columbia University, and other large libraries on decorative art.

Roman Stuccoed Vault in Tomb on Via Latina

PLATE DESCRIPTION.

Bancroft Hotel, Saginaw, Mich. Plates 159–161. This building is located at the corner of Genessee and Washington avenues, with a frontage of 160 feet on the former and 140 feet on the latter thoroughfare. An addition to the south on Washington avenue contains seven stores on the first floor and above a roof garden. The Washington avenue side of the hotel is also devoted to stores on the first floor. The three-story addition at the end of the other façade is occupied by the Board of Trade on the first floor and by hotel offices and bedrooms on the upper floors. The main dining room together with the smaller coffee room and private dining room and the large banquet room on the second floor are conveniently arranged with reference to the kitchen, which is placed in the rear of the first floor.

The upper floors are given over to guest rooms which number 208, 131 having private baths and the remainder running water. The rooms on the second floor are arranged to serve chiefly as sample rooms.

Illinois Central Hospital, Chicago, Ill. Plates 162–164. The site occupied by this hospital has a frontage of 470 feet, with an average depth of 225 feet, which provided a good opportunity for a satisfactory grouping of the buildings. While the present group provides for but 111 patients, future buildings will give a total capacity of 250 patients' beds and 150 nurses' and help's beds.

The service that the hospital performs is primarily the treatment of the sick and injured employees of the Illinois Central Railroad. This fact makes it largely a hospital for men and from 65 per cent to 75 per cent surgical, and is also responsible for the variations in plan from that of the usual hospital, chief among them the large amount of recreation space and the small number of private rooms. The size of the wards is considerably smaller than usual, the largest having but four beds.

The entrance lobby divides the building into three parts, as a glance at the plan will show. The upper floors naturally divide themselves into similar units, each having its own toilet and utility rooms with services common to all at the crossing. Here the freight and passenger elevators, stairs, serving pantry, nurses' station, linen rooms, etc., are located. Service from the kitchen is by means of electric dumbwaiters. The nurses' station is so situated as to control the entire floor and is equipped at one side with a large steel medicine case with a sink and illuminated annunciator box.

On the second floor at the end of the west wing is the isolation unit of two small rooms with connecting bath. These may be arranged to provide one to five beds, and in case of an epidemic the entire wing of fifteen beds could be used.

The third floor is similar to the second, with the exception that the west wing is devoted to the operating department and that there are fewer private rooms. The operating suite has gray vitreous tile floors with terrazzo base and plaster walls, the latter painted a light olive green and the ceiling a cream white. The rooms at night are lighted by rows of lamps and reflectors set in steel boxes flush with the walls and ceilings and outlining the operating room windows.

For the ambulatory patients a suite of recreation rooms is arranged on the fourth floor. Over the entire south wing on this level there is a solarium with a quarry-tiled promenade deck. A small serving pantry, toilet room, etc., complete the arrangements on this floor.

In the basement are the kitchen and its accessories. This is a two-story room with exposure on opposite sides, insuring the best of natural ventilation, which is supplemented by a complete mechanical exhaust system.

The power house is an entirely distinct building connected with the hospital by a commodious pipe tunnel along the north wall of the west wing. This tunnel also serves as a passage between buildings for laundry and supplies, etc.

Oakland Auditorium, Oakland, Cal. Plates 165–169. This municipal structure for the housing of large public gatherings was promoted by the Chamber of Commerce and the various improvement clubs in the city of Oakland. It is ideally located on a large area that will later be improved with drives, lawns, and shrubs to form a part of the Lake Merritt Park system. The object in planning the Auditorium was to provide accommodation for every form of public gathering, from a small dance to the largest theatrical production and national convention. The building is 400 feet in length by 200 feet in width and rests on 2,200 piles ranging from 70 to 90 feet in length.

The main façade is on the north and contains seven niches of sculptural work by A. Sterling Calder, executed in architectural terra cotta.

The interior is divided into an arena and a theater, having a total seating capacity of more than 10,000, and separated by a stage which can be used together or divided by asbestos curtains for the use of either section. The arena has a floor space of 111 feet by 216 feet, with balconies and galleries extending on both sides and across the end and reached by run-way inclines. From the floor of the arena to the apex of the roof is 90 feet, the balconies running from within 15 feet of the floor to the eaves of the building, and in this entire space there is not a single supporting column or obstruction, the roof being carried by three-hinged steel arches designed like a spider's web. The floor is equipped with portable seats which are stored in the basement when not desired. Between the niches in the north corridor are alcoves with storage facilities from which refreshment concessions are operated.

The theater, located in the western end of the building, has a seating capacity of 2,000 people and contains an orchestra floor and two balconies. The interior has been decorated in plaster and bronze and finished in a harmonious color scheme through the efforts of Arthur Mathews, the artist who collaborated with the architect.

The stage has a width of 100 feet and a depth of 40 feet, and has a full modern equipment for the handling of all classes of productions. In addition to the arena and theater the Auditorium contains an art gallery, ball room, and two lecture rooms for the accommodation of small gatherings.

The architectural conception of the building is the work of Henry Hornbostel, who acted as consulting architect, during both design and construction periods.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE name D. A. Gregg has been one to conjure with among the young men of the past two or three generations who have been striving to realize architectural ideals, and probably no one man exerted so powerful an influence upon the pictorial side of architecture as this very simple, unassuming, kind hearted man whose death came so recently as a surprise to all who knew him and appreciated the wonderful work he had done. We have but to pick up any architectural publication prior to 1880 to have borne in on us how crude were the methods of architectural draftsmanship in those days and to appreciate how much one man's ability along just one line of architectural manifestation was felt by the whole profession. Architecture is by no means a trick of rendering pictures of buildings; but just because the architect's conception far outspeeds his means of graphic representation, so an advance in methods and character of drawing helped far more in the production of good architecture than is sometimes appreciated. Mr. Gregg came into the profession of architecture in 1879. Aside from Mr. Hughson Hawley, there was then hardly a man in the country who made a business of architectural rendering. The methods of photographic reproduction were just beginning to be commercially available and line drawings were essential. Most of the perspectives in the architectural magazines of those days were made with T square and triangle and were marvels of utterly uninteresting distortion of effect. Mr. Gregg was at first hardly better than his associates, but he speedily developed a style of his own and he was able to systematize, so to speak, his free hand work, with the result that in a very few years a Gregg drawing could always be recognized. It was always good, and architects young and old sought first for his peculiar signature at the bottom of his drawings before even taking in the architecture. By the character of his work he aroused an interest in good architecture which was of incalculable benefit to the profession, and he made the illustrations in architectural magazines of permanent and positive value; and when a few years later he began to take up color, he evolved a scheme of rendering in flat tones with very slight accentuation of contours and with a thoroughly discriminating and keen sense of values which was a revelation and an entire innovation in architectural drawing. During the past twenty years or more his influence was greatly extended by reason of his connection with the Massachusetts Institute of Technology, and there is not an architect who has graduated from that institution but has profited by his instruction and his example. In every city in the country he has been associated with the pictorial representation of the best of architecture, the most interesting of the buildings. His life has been thoroughly well rounded out. During recent years he has taken less share in the work, but up to the very last his hand retained its cunning and his eye was quick to see and analyze the essential merits of an architectural design often dumped on him in very inchoate form by architects who knew if they once got Mr. Gregg to make the picture the building would be properly presented. And on competitions it was often a scramble to see who could first secure his services in rendering.

With all success he remained the simple, unaffected gentleman whom everybody loved and trusted; a man as pure in his personal point of view as in his drawing, as keen in his appreciation of the beautiful in life as the beautiful in line. He came from England a stranger. He built himself into the architectural history of the past thirty-five years, and to more than to any other of the many helpers that the architect has been able to call to his assistance does the profession owe a deep debt of gratitude to D. A. Gregg.

PARLIAMENT HOUSE COMPETITION.

THE Australian Government announces the resumption of the Architectural Competition to select the architect for the Parliament House in the new capital city. This competition was opened in June, 1914, and suspended in September, 1914, owing to the war, but is now reopened on the original conditions to all friendly countries (enemy subjects not being eligible), the date for receiving drawings being extended to Jan. 31, 1917, at London and Melbourne.

Programs can be obtained by application to the High Commissioner for Australia, 72 Victoria street, Westminster, London, or to the British Embassy at Washington.

Outline sketch designs only are required.

Eight prizes, aggregating £6,000, are offered, the first being £2,000.

An International Jury of the following architects is asked to make the awards: George T. Poole, Australia; Sir John J. Burnet, Great Britain; Victor Laloux, France; Louis H. Sullivan, U. S. A.; Eliel Saarinen, Russia.

BOOK NOTES.

THE RELATION OF SCULPTURE TO ARCHITECTURE. By T. P. Bennett, A.R.I.B.A. Ill. 204 pages. 6½ x 9½ inches. London, Cambridge University Press; New York, G. P. Putnam's Sons. $4.50. To awaken a greater interest on the part of architects in relation to the sculpture for the adornment of buildings and to foster a more complete understanding between architect and sculptor is the purpose of the author of this book. He approaches his subject with a clear architectural sense that defines from the start the respective degrees of importance of these arts. He states frankly that it is quite possible to have beautiful modeling which may be utterly bad decoration from the architectural view-point. The sculptural and architectural forms should complement each other, and to attain this end the sculptor should translate his personality if necessary into the key adopted by the architect.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

NOVEMBER
1916

DEVOTED TO THE ART AND SCIENCE OF BVILDING

ROGERS AND MANSON COMPANY PVBLISHERS

GIOVANNI LORENZO BERNINI

BORN IN NAPLES, 1598. DIED IN ROME, 1680. ARCHITECT OF COLONNADE OF THE PIAZZA OF ST. PETER'S, AND WORK AT THE VATICAN, ROME

THE BRICKBVILDER

VOLUME XXV NOVEMBER, 1916 NUMBER 11

The Dome of St. Paul's, London

A STUDY OF ITS STRUCTURAL SYSTEM

By RICHARD FRANZ BACH

Curator, School of Architecture, Columbus University

AS compared with the long and turbulent structural history characterizing the building of S. Maria del Fiore and of St. Peter's alike, the record of St. Paul's offers a pleasant relief. Untold experiments, indecision, intrigue, and the cumulative success due to the efforts of a series of controlling hands are not here to be found, for the building as it stands is the work of a single architect who, within the space of thirty-five years (1675–1710), laid its first foundation block and saw the last stone of the lantern set in place; as Elmes writes, it was done by Wren "alone and from his sole productive mind; whilst St. Peter's was the work of more than twenty architects, supported by the treasure of the Christian world, and the power of the Roman Pontiffs in their most powerful days and during the reigns of nineteen successive popes."

Before 1675 Inigo Jones had restored the building, retaining the Gothic for its body but favoring its front with a curiously alien portico in "the better Roman manner," called Palladian, and reluctantly making every necessary concession to the usual nave, aisle, and clerestory section behind it. Later efforts had likewise been made on the part of a commission of four, including Sir Christopher Wren, to repair the damages caused by Puritan desecrations, — horses having been stabled in the choir and extensive injury caused throughout. The fire of 1666 which razed the major portion of the then city area of London, did not spare St. Paul's, and destroyed likewise a large number of churches, public buildings, guild halls, and the like, all of which (not to mention the replanning of the entire city) Wren undertook to replace, in his capacity of Surveyor-General of His Majesty's Works. An amazing volume of work passed through his hands, although his architectural experience was limited and of recent acquisition and his training had been that of a mathematician and astronomer, he having held a professorship in the latter subject at Oxford.

The restoration of the church after the fire was found inadvisable and Wren was required to prepare designs for a new cathedral, which, according to the *Parentalia** occasionally to be quoted herein, was to be "a Fabric of moderate Bulk, but of good Proportion; a convenient Quire, with a Vestibule and Porticoes, and a Dome conspicuous above the Houses." The architect had long favored a domical crossing, even for the restorations of the old edifice and his first design presented a Greek plan type with this feature at the crossing, the main portion of the edifice preceded by a narthex suggested from San Gallo's plan for St. Peter's. The wall is brought out in each of the angles formed by the arms to a reëntrant curve terminating in the adjacent corners of the arms. The dome in this design rests upon a circular drum bearing upon eight piers, the angles in the plan behind the curved walls mentioned above being covered with small domes. For one-fourth its height the heavy drum is plain, but in its main portion is treated as an arcaded gallery, the arches resting on piers against which appear Corinthian pilasters. Above the entablature of the latter simple reversed consoles carry the line of each pilaster backward to the spring of the dome on whose outer surface are a series of rib motives, having no connection with its construction. The spring of the dome is weighted by means of a variant of the buttressing mass seen in the Roman Pantheon, rising to the haunch of its semi-circular dome, and likewise indicated in Bramante's dome scheme for St. Peter's. This continuous anchor buttress is disposed as an attic, its frontal plane far behind that of the drum, the dome within springing, however, from a much lowel level. The dome itself was designed to be solid up to about one-fourth its altitude; above that two shells were projected, the inner semi-circular and abutting against a large oculus, the outer of very pointed section and bearing a peristylar lantern.

Wren took ample care to avoid the errors manifested in St. Peter's, although the chief difficulties of the latter were not brought to light until after his death. His projected inner shell was given adequate support and counterthrust by his retention of a single shell up to such a high level, while the high section of the outer shell minimized its own thrust, as the Florence dome had demonstrated.†

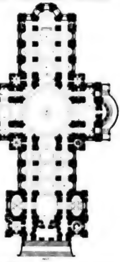
The mass of the drum, which is not to be construed as a solid, is thicker at the top than at the bottom, due to the sloping inward or batter of its inner face, forming on its interior a truncated cone which further operates to reduce the dome thrust. Throughout it will be seen that Wren kept the problem and solutions of Bramante and Michelangelo in Rome constantly before him, probably through the agency of Serlio's *Architettura*, since he had never traveled in Italy. Michelangelo's three shells, as shown in his model previously discussed,† Wren proposed to reduce to two by eliminating the middle instead of the inner

* See Bibliographic Note.

† See THE BRICKBUILDER for August 1916 and October 1916.

as was done in the final execution of St. Peter's. His two shells were also designed to rise to their crowns independently, without bonding ribs.

As was the fate of Bramante's and Michelangelo's favored Greek cross plan for the Roman church, Wren's first design was set aside because it deviated too much from "the old Gothick form of Cathedral-churches." Much disgruntled, Wren set to work on another design which was to accomplish the desired reconciliation of styles old and new, "to reconcile, as near as possible, the Gothick to a better Manner of Architecture." His new design, which was the result of a series of detailed studies, presented an elongated nave and choir, but not truly a Latin cross plan, since the transept remained near the middle. A most remarkable and inexplicable feature appeared at the crossing, however, a combination of dome and spire in the form of a truncated dome surmounted by a drum bearing a smaller dome of oval section, this in turn forming the base for a spire in six stages. The motive is unusual in the extreme and seems not to have been favored with a satisfactory explanation at any time as to the architect's real meaning. It seems an egregious heaping up of elements in given lengths, seemingly as they came to hand and lacks the good reasoning of Wren's otherwise accurate perception. Yet this design was granted approval of King Charles II, but with the happy proviso that, when the work was under way, Wren might "make some variations, rather ornamental than essential, as from time to time he should see proper." The construction to be placed upon the word *ornament* being as wide as the limits of art, it is seen at once that the architect was given considerable freedom. The present cathedral is the executed work based upon this "warrant" design, alterations therefrom were made "on the job" by the designer who personally supervised all aspects of the undertaking, and freely availed himself



Dome of St. Paul's, London. Plan of Cathedral
(From Dugdale)

Dome of St. Paul's, London. View of Cathedral from Southwest

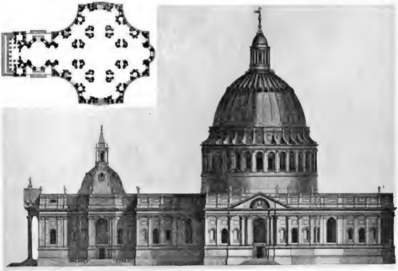
of the liberty offered in the rider to his warrant of approval to make such changes as he deemed proper.

As we have it, St. Paul's dome presents a novel structural system, evidently the work of a painstaking and studious master, its elements traceable in a number of its predecessors but having itself no definite precedent. Taken at their full value, regardless of other faults — such as "barbaric combinations" of Gothic and Renaissance motives in ornament — all of Wren's buildings manifest similar concentration.

Dome of St. Paul's, London
Interior of Wren's First Design at Crossing. *(From Longman)*

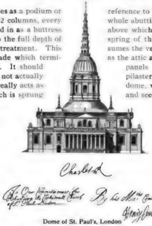
The executed dome rests upon a substructure consisting of eight piers (all of which together have an area less than that of one in St. Peter's, Rome) connected by cross arches, those on the principal axes being semi-circular and those on the intermediate axes segmental, and surmounted by a section of wall and another suggested supporting arch to attain a uniform height and similarity of structural effect on all sides of the basic octagon. The disposition of this group of archivolts was rendered necessary by the octagonal crossing as based upon piers at all angles; its use may have been suggested from a similar arrangement in the Octagon of the Cathedral of Ely, of which Wren's uncle was Bishop, and has been the subject of much critical discussion, because of the manner in which its segmental cornice intersects the horizontal cornices of the piers upon which it rests; although, of course, the continuation of the horizontal cornice in its present form was imperative for the pilaster order beneath, and an arch of full height and consequently of proper treatment at its spring was not possible on the diagonal axes of the octagon. The example at Ely, being Gothic, had all the advantages offered by the flexibility of the pointed arch, which makes possible a grouping of a number of arches of different spans, yet achieving a uniform height at their crowns or apexes.

The drum rises directly above the arches in the form of a double wall. Of this the outer member is treated as a simple surface with small unframed windows necessary for light only to a height of about 50 feet, of which at least half is concealed by the timber roofing of nave and transepts.



Dome of St. Paul's, London. Elevation and Plan of Wren's First Design for Cathedral. *(From Loftie)*

In exterior treatment this stage serves as a podium or base for a Corinthian peristyle of 32 columns, every fourth intercolumniation being filled in as a buttress of square plan extending back into the full depth of the drum and with exterior niche treatment. This order is surmounted by a balustrade which terminates the outer wall of the drum. It should be added that each of the columns not actually included in the buttress motives really acts as a minor buttress itself, since an arch is sprung behind each from pilasters of about one-third the height of the peristyle and walls are built above these arches to the level of its cornice. Metal ties are placed, respectively above each of these small arches and at the entablature level, their inner ends anchored in the inner dome shell.



Dome of St. Paul's, London
Wren's Accepted Design and Royal Warrant
(From Longman)

The inner wall of the drum is built in the form of a frustum of a cone so that all its motives slope inward or are given a batter (amounting to a difference of 8 feet between its lower and upper diameters) as they rise from the heavy cornice indicating the base of drum (directly above the crowns of the great arches) whose face is set back to such depth as to provide ample space for a gallery.* From this cornice, whose circle has a diameter of 110 feet, the raking drum rises as a plain wall surface for nearly 20 feet, above which appears an order of pilasters, corresponding radially with the peristyle without but set at a much lower level. Every fourth intercolumniation is again filled in solid carrying through the buttresses above mentioned. Windows alternate with these pilasters and provide the main source of light for the dome interior above, which rises in slightly oval section from the entablature of the interior order. This dome forms the inner shell, 18 inches thick, built of brick with bonding courses at 5-foot intervals consisting of special brick 18 inches long laid with reference to the hypothetical radius of the dome, the whole abutting against the rim of an eye or oculus above which has a diameter of 20 feet. From the spring of this shell the inner wall of the drum resumes the vertical again and appears in the exterior as the attic above the peristyle, treated as a series of panels with windows over, alternating with pilasters. Upon the attic is built the exterior dome, which apparently rests directly upon it and seems to support the lantern, but which is in reality a monumental piece of deception, consisting merely of a domical surface of wood and lead with fine contour, borne upon a stout oak skeleton. Neither this dome nor the much stronger inner shell have any structural work to do, forming part of an æsthetic rather than a structural system.

Dome of St. Paul's, London. Cross Section Through Dome and Understructure of Present Edifice
(From Britton)

The work of supporting the lantern falls upon an intermediate invisible shell in the form of a brick cone rising with an even thickness of 18 inches from a point near the haunch of the inner dome, its apex cut off and replaced by a small segmental stone dome pierced by an opening 12 feet in diameter. Above this point, at a height of 266 feet from the pavement, appears the lantern, which is itself 50 feet high. This conical shell is conducive to the utmost stability, which quality is further encouraged by the conical treatment of the inner drum assisted by the load of the lantern, and by the filling in with solid masonry of the space between the inner shell and the exterior attic wall, — a point where two thrusts in combination must be resisted, — thereby providing substantial counterthrust for the former and strong foundations for the conical shell which really has its base in this filling. A series of thirty-two spur walls, which may also be called buttresses, are built inward from the attic wall to the base of the cone. These are perforated to provide for passages; their weight adds to the counter-

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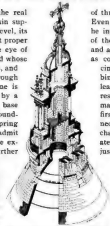
*The so-called Whispering Gallery

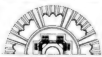
thrust before mentioned and they form the real foundation for the outer dome, whose main supporting timbers have their bases at this level, its secondary supports resting upon corbels at proper levels in the cone surface. Between the eye of the cone and the inner dome there is a void whose height is 50 feet, as measured at the crowns, and which obtains its light almost solely through the oculus of the inner shell. The cone is pierced by three rows of oval loopholes, by a series of larger arcuated openings at its base behind the windows of the attic and by round-headed openings at top just beneath the spring of its segmental dome. These openings admit light also to the interior of the deceptive exterior dome, which is itself lighted by a further series of openings just under the lantern.

The lantern is again constructed as a double wall. The inner, cut by arches at its base, rises as an octagon around the eye of the cone and is covered with an octagonal cloistered vault, whose crown is again cut off to form a smaller eye at a height of about 36 feet from the cone. Above this vault rises an attic supporting a still smaller dome and finial in the usual combination of ball and cross, the total exterior height of the whole being 340 feet.

The outer wall receives more varied treatment. A platform is built directly above the crown of the outer dome upon a double wall, its inner member resting upon arches bearing upon the haunch of the vault over the cone, its outer portion supported upon a corbeled shelf built out from the cone surface at the sill level of its uppermost row of openings. Above this platform a simple block of Greek cross plan, treated with niche motives on the ends and sides of its arms, except on its major axes where openings appear, serves as base for a peristyle consisting of coupled columns flanking tall rectangular openings. The entablature of this smaller Corinthian order terminates the exterior wall of the lantern.



Structural System of Crown of Brick Cone Showing Section of Lantern



Dome of St. Paul's, London
Plan of Lantern

Dome of St. Paul's, London. Interior of Present Cathedral
(*From Engraving by John Coney in Dugdale*)

Wren well knew the limitations of all freestanding domical structures in which great height is attempted and the full sweep of contour must be visible, at the expense of frankly expressed buttressing features. Hence his use of the tallest vaulting section possible for his main support, the cone, whose line of thrust most nearly approximates the vertical. Even distrusting the final stability of this feature, he introduced in the cone — much to the distress of those who insist upon candor in construction and an absolutely true equation of material forces as construed by the spectator — four composite cinctures, each comprising a belt of stone as binding course, containing a chain run in with lead, while two additional chains were inserted respectively at the spring and at the level of maximum thrust. Further cinctures appear, first, in the form of a heavy double chain, connected in ten foot sections, run with lead in a channel located near the outer wall immediately below the springing of the cone and just outside its circle of pressure; and, secondly, in a lighter double chain set behind the attic cornice.

From these various indications it will be seen that although Wren saw fit to depart from the so-called warrant design to the extent of entirely altering his chief motive (not to mention important changes elsewhere in the structure), he was prompt to hark back to his first rejected design in certain particulars, while retaining in great measure the height, required to make his edifice "conspicuous above the houses," seen in the executed dome. In the *Parentalia*, we find, in explanation, the words, referring to domes: "The age had been so used to steeples that these round designs were hardly digested unless raised to a remarkable height," and again: "The old church having had before a very lofty spire of timber and lead, the world expected that the new work should not in this respect fall short of the old (though that was but a spit and this a mountain). He was, therefore, obliged to comply with the humor of the age and to raise another structure about the first cupola, and this was a cone of brick, so built as to support a stone lantern."

Precedents in Wren's case differ decidedly from those to which Brunelleschi, Bramante, and Michelangelo had ready access. Having never visited Italy, Wren could have been acquainted with St. Peter's only through the published works of Andrea Palladio or Sebastiano Serlio. It may have been noticed that his designs give evidence of careful study of the solutions used in the Roman Pan-

theon and in St. Peter's; his final exterior treatment, furthermore, drum and attic and dome in their essential proportions recall the Tempietto by Bramante standing in the courtyard of S. Pietro in Montorio on the Aventine in Rome, and this also he could have seen in either of the authors mentioned. He had spent six months in France, however, during the plague in London in 1665, but Lemercier's dome at the Sorbonne was the only monument of domical construction available for his purposes in the regions which Wren visited. He could not have seen the dome of the Invalides, built by Jules Hardouin Mansard, the construction of which occupied the years 1680–1706, although it is barely possible that this architect might have shown him sketches of his projected work so many years in advance, for he met Mansard in Paris. He may also have seen sketches of this and other domical works in the hands of travelers from France and Italy while he himself was in London. The Panthéon of Soufflot was not built until 1764, fifty-four years after Wren's work was completed and thirty-two after his death. Wren's solution, regardless of the "fraud" in church and dome alike at which purists have railed, must be considered as distinctly his own conception. It has been construed by critics as the work of the mathematician who made sure of the stability of his work and then clothed it as the eye dictated with an exterior conformable to popular demand and the requirements of style in the design in hand. No doubt he was of those who feel that the essential harmony of construction and design must not be permitted to hamper too seriously either construction or design, and that occasionally success must be bought, — however little certain of us approve of the sacrifice, — at the expense of a modicum of architectural morality. For this general question of ethics in æsthetics we have here no space. Suffice it to say that the visible result, which alone concerns us at the moment, though lacking in a degree of majesty, has yet a decided sublimity and enviable dignity, that though its harmony of exterior lines may be in a degree obtained by false pretenses, its structural system merits the utmost praise as its stability throughout two centuries fully attests.[*]


Tempietto of Bramante in S. Pietro in Montorio, Rome

Bibliographic Note. The brief compass of this paper has made it impossible to cover in detail the numerous points of interest in the history and criticism of this dome, and, therefore, to facilitate more extensive research the following list of references is given for those interested: Blomfield, History of Renaissance Architecture in England, London, 1897; Britton, The Fine Arts of the English School (essay by Aikin), London, 1812; Dimock, The Cathedral Church of St. Paul, London, 1901; Dugdale, History of St. Paul's Cathedral, vol. 2, London, 1716; Elmes, Sir Christopher Wren and His Times, etc., London, 1852; Fergusson, History of the Modern Styles of Architecture, vol. 2, London, 1891; Gilbertson, St. Paul's Cathedral, London, 1902; Loftie, Inigo Jones & Wren, etc., New York, 1893; Longman, History of St. Paul's Cathedral, London, 1873; Milman, Handbook to the Cathedrals of England, St. Paul's, London, 1879; Milman, Sir Christopher Wren, London, 1911; Moore, Character of Renaissance Architecture, New York, 1905; Simpson, History of Architectural Development, New York, 1905; Wren, Parentalia, or Memoirs of the Family of the Wrens, London, 1750; also various articles in the Journal of the Royal Institute of British Architects for 1907, and in the Architectural Review (London) for 1914.

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[*] Barring, of course, the weaknesses latterly examined and found to be due largely to the settlement caused by the vibration of the underground railways and the use by Wren of stone inferior to that specified, because of difficulty of transportation and the almost pardonable professional sin of desiring to assure the completion of the entire edifice during his own lifetime.


Dome of St. Paul's, London. View Between Inner Shell and Brick Cone


Dome of St. Paul's, London. View Between Brick Cone and Outer Dome

(From Architectural Review, London)

View on Park Avenue Looking South Toward Grand Central Buildings

"From Twenty-Third Street Up"

II. 42D STREET TO 59TH STREET

By AYMAR EMBURY II

QUITE the most interesting part of New York to-day is the district between 42d street and 59th street, and between Park avenue on the east and Broadway on the west. Eight or nine years ago this was a dull, little frequented, and shabby portion of the city, except for the residence district along Fifth avenue and in the side streets immediately adjoining, which at that time was the most "exclusive" residential section of New York. A large part of it was restricted property, and the balance, because of the restrictions, appeared unlikely to become anything else but residential property. So settled was the apparent character of the district that the Kane House at 49th street and Fifth avenue, unquestionably one of the most beautiful private houses in New York, was built less than ten years ago, while a number of other houses of smaller size, but of equal interest, were constructed at about the same time.

The first invasion of the district was a sort of flanking movement up Broadway; some of the theaters were built above 42d street, and their location was invariably commented on as being out of their proper district, and inaccessible. Following the theaters, moved the Tenderloin, and with the real Tenderloin moved the gay restaurants, the cabaret shows, and dancing places, which, outside the lower circle of Tenderloin life, constitute a sort of *demi-monde* of their own.

Yet so sudden and so complete was the change in the location and physical character of the buildings provided for the amusement of the so-called theatrical and sporting sets that we are accustomed to think of the "Great White Way" as an old established institution, whereas as a matter of fact it was only about five years ago that the two popular songs, "Give my Regards to Broadway" and "There is a Little Street in Heaven that they call Broadway" were written and sung; both of these songs, of course, referred to the Broadway around and above 42d street.

42d street itself has probably changed in character more than any other single street in New York; it used to be a rather shabby horse-car street, through which one often passed but never got off—there was nothing except the Grand Central Station to get off for. To-day the Police Department of New York reports that more people cross 42d street and Fifth avenue than any other street intersection in the world, and traffic at 42d street and Broadway is almost as dense. This has been due to several factors: the first being the subway, with an express station at the Grand Central and a local station at 42d street and Broadway; second, several big hotels were built directly on the street and a number of others built so close to it that it became the most convenient artery of travel to and from them; third, a number of the theaters moved into the block between Seventh and Eighth avenues, because this block contained the most accessible cheap property near Broadway, and that block now contains about a dozen theaters. In addition to these changes one of the largest department stores, Stern Brothers, moved from the south side of 23d street to the north side of 42d street, a location midway between Fifth avenue and Broadway, where traffic is dense and transportation convenient. None of these buildings, with the exception of the group around the Grand Central Station, has been of particular interest, although the Times Press Building is far from being a poor example of

View Looking North from Corner of Vanderbilt Avenue and 42d Street

the office building type. The greatest development adjoining 42d street has, however, been around the Grand Central Station.

When the officials of the New York Central Railroad decided sometime ago that more space was necessary for their terminals, they realized that with electric locomotives, tracks need no longer be open, and that space above the ground was as valuable with tracks below as without them. They therefore purchased whatever property was necessary for the construction of their terminals, and as the tracks have been completed, have erected, one by one, large, and in general, handsome structures around the northerly continuation of Park avenue. The station is in itself somewhat disappointing, and the buildings around it do not quite measure up to the opportunity which was presented; but they, nevertheless, form a stately, handsome, and reasoned group, in which the cornice heights have been kept the same, and the scale and proportion of the architecture have been likewise held. It has therefore been most satisfactory and of great additional value in showing how interesting and picturesque a grouping can be made from buildings of the same general character. The view from 42d street, for example, looking up Vanderbilt avenue, shows this extremely well. The station is in sharp perspective at the right; at the left is a low office building of the same general character and of the same height; beyond, covering the next two blocks, are the Biltmore Hotel, the Vanderbilt Concourse Building, and the Yale Club, on all of which the cornice height of the station has been recalled by a band course, while the heights of the buildings themselves have been kept the same. The treatment here is admirable in itself and splendidly thought out.

Perhaps the most interesting view of the station, and one which is little noticed, is that looking down 43d street from Fifth avenue toward the carriage entrance, with the Biltmore Hotel at the left and office buildings at the right. The simplicity and dignity of the station from this point of view is not equaled by its more pretentious façade.

From the north, looking south on Park avenue, an even more interesting grouping of buildings is seen. It is the only open space in New York flanked by large buildings of substantially similar character, and while it might be more desirable to have more of the city so developed, the apparent restfulness of this open space is increased by contrast with the usual heterogeneous design in our adjoining buildings. The change in the character of Park avenue is only what must be expected. It is the main artery between two excellent portions of the city, and when the nuisance from the smoke filled tunnel of the New York Central Railroad was done away with, it was

Office Building, Vanderbilt Ave., Opposite Grand Central

Detail of 42d Street Facade of Grand Central Terminal

Warren & Wetmore and Reed & Stem, Associate Architects

inevitable that it should become one of the fine residence streets. But since "residence" in New York means "apartment," the buildings facing on it are for the most part apartment houses of approximately equal height and, though designed by various architects, of generally similar scale and proportion. A few shop buildings have crept in, one of the most interesting being the new Hayden Building at 57th street designed to house the activities of this firm alone.

The upper fifties are the streets which appear likely to become the center of the club district. The clubs in New York have been steadily moving farther and farther north, and while the University Club was for many years a solitary outpost at 54th street and Fifth avenue, it is now no farther north than many of the others. The pleasant new building of the Calumet Club is on 56th street, just west of Fifth avenue; the new building of the Knickerbocker Club at 62d street and Fifth avenue; the new Colony Club at Park avenue and 60th street; the new building for the Princeton Club is to go at 58th street and Park avenue, and the new Theatrical Club, "The Friars," is about half-way between the theater and the Fifth avenue district, in 48th street, near Sixth avenue. It is a rather interesting thing that three of these clubs — the Colony Club, the Knickerbocker Club, and the Calumet Club — should have been executed in substantially the same style of architecture, a modification of Georgian, and they are perhaps as interesting pieces of design as anything we have had in the city for some time. The Friars' Club has chosen a style more or less appropriate to its name and has a most interesting pseudo-Gothic façade, but one which is nevertheless distinctly "clubby." The use of Gothic has been extended, as was said in the last article, to a number of the loft buildings in New York, and they show how great a variance is possible with good design in the same style.

The building for the Hampton shops is of all those in the Gothic style the most interesting and in many respects the most consistent; it is a very lovely piece of design in the Gothic manner, with a full realization of the requirements of the modern office building and of modern construction. It is also pleasant to see that the architects of this building did not stop the design with the street façade, but designed a side wall which is agreeable in itself, of balanced character, and even including the water tanks is a very pleasant object.


View Looking Down 43d Street to Grand Central Terminal

The newest of the tall office buildings — and designed to house the newest of our industries — is the Film Building at Broadway and 49th street. This is an extraordinary piece of architecture and in many respects a very satisfactory one, with decorative motives which have been lifted more or less bodily from medieval Italian


View Looking North Along Park Avenue
from 53d Street


Hayden Building, Park Avenue and 57th Street
Louis Allen Abramson and Lawrence Barrand, Associate Architects

work. For the main cornice the architects have substituted the machicolated balcony, similar to those on some of the Italian town halls, and curiously enough the motive which fits the tall, slender type does not appear at all misplaced as the crowning motive for this tall, box shaped structure. The details of the lower stories are of extreme interest, especially in the handling of the brickwork and in the treatment of the ironwork around the windows and the plate glass above. It may be possible that the novelty of the building is what attracts me to it, and yet I cannot help feeling that the architects have produced something of great originality and structural merit.

Aside from this building, the Broadway district has little of very great interest to offer, and it seems regrettable that so many amusement structures should have been erected with so little architectural merit. Yet there is probably no other sort of building where fertility of invention and play of judicious fancy is afforded so great an opportunity. This we saw at Dreamland, Coney Island, some years ago, when the amusement park built out of lath and plaster displayed architectural quality surpassing most exhibition work.

Unfortunately about the only building in the theater district which has any real quality of modernity and gayety is the little Punch and Judy Theatre, where the façade is of the simplest possible description, relieved by a couple of color decorations and some decorative lines. The conception is one new to the theater and most appropriate not only to theatrical work in general, but to this particular house. Of another type is the Cort Theatre, one of the best designed of the newer buildings and to which little exception can be taken. Of excellent material, good in detail, obviously fitting its purpose, the only thing which can be said against it is that it lacks theatrical instinct. I have often wished that architects could design some of the stage sets in which architecture is used: now I am inclined to think that some of our scenic artists could design theater façades which would be more interesting and more appropriate, possibly even more beautiful, than our architects have been doing. This is, of course, in part due to the fact that theater designing has been mainly in the hands of a very few men who have made a specialty of it, and they have been selected for new work in this line because of their knowledge of the practical requirements without regard to their æsthetic qualifications. I do not, of course, mean to say that all theater designers are incompetent architects, but certainly there are very many men who could design better façades than most theater architects have produced. The theater competitions in THE BRICKBVILDER alone are evidence enough on this point.

The residences between 42d street and 59th street are few and far between, and with the exception of the apartment houses before spoken of along

Friars Club, West 48th St.
Harry Allan Jacobs, Architect

Knickerbocker Club, Fifth Avenue and East 62d Street
Delano & Aldrich, Architects

Black, Starr & Frost Building
Fifth Avenue
Carrere & Hastings, Architects

Colony Club, Park Avenue and
60th Street
Delano & Aldrich, Architects

Dreicer Building, Fifth Avenue
and 46th Street
Warren & Wetmore, Architects

Park avenue, show little that needs special comment. There have been built, however, on the side streets between Fifth and Sixth avenues, a few apartments in which the modern variation of Adam architecture has been employed with excellent effect. The illustrations of apartments herewith are of good clean cut design, and while perhaps no better than a number of others recently constructed, are at least up to the highest current standard. There are many apartment houses of this type being erected in New York, and the examples illustrated show what can be done with a rather difficult problem and with a very sparing use of expensive materials.


Film Building, 49th Street and Seventh Avenue
H. L. Meader, Architect

The other "residences" within this district are mainly hotels, of which the Ritz-Carlton is an excellent example, and bachelor apartments or studio apartments above the shops in 25-foot buildings. I cannot refrain from again illustrating the lower portion of the Ritz-Carlton simply because of the exquisite proportions of the base and order, which have served for a model for so many of the large hotels built in the last five years.

After all, the chief interest within this district, both architecturally and to the visitor to New York, is the small shop, and in this respect New York is perhaps unique. I have yet to find in any of our other large American cities the smart, small shop developed to a like degree, and certainly nowhere is there such an assemblage of small shop buildings of such excellent quality. It is true that no single style of architecture has been employed for them, but the very diversity of motives which have been used is a commensurate gain in their interest to the architectural designer, although these motives seem to have been chosen not because of their particular fitness to the goods displayed in the shop, but mainly for their novelty and intrinsic merit.

The shop for the Edison Company has been several times illustrated, and it is regrettable that no illustration can do justice to the richness of color in the terra-cotta work filling the window openings and decorating the cornice, which latter, by the way, is ugly in an illustration and lovely in reality. Alexander's shoe shop has a similar cornice treatment, not perhaps so good, but the balance of the building, magnificently enriched with sgraffito as beautiful in execution as it is in design, leads one to admire it more than any other on the avenue.

Joseph's, at 632 Fifth avenue, is of widely different type, ultra modern in its tendencies and very excellently done, although somewhat hard and wire drawn. Dreicer's jewelry shop looks the part; the base is of black and gold marble with gilded caps; the upper stories are of limestone, and the building as a whole is quite as agreeable as the more elaborate, and perhaps more carefully designed building of Black, Starr & Frost. In 48th street a number of these small store


Punch & Judy Theatre
Murphy & Dana, Architects


Detail of Lower Stories of Film Building
H. L. Meader, Architect


Cort Theatre
Thomas W. Lamb, Architect

buildings, running from five to six stories in height, are placed in juxtaposition, and while one cannot admire the combination of German *art nouveau* and quiet Italian art in two neighboring buildings, each is clever in its way, and the Italian one is beautifully detailed.

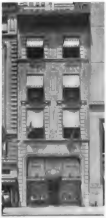

Hofstatter and Revillon Freres Buildings
Henry Otis Chapman, Architect

In striking contrast to the careless disregard of neighboring structures is the treatment of the block on Fifth avenue between 52d and 53d streets. On the northwest corner of 53d street is St. Thomas' Church, familiar to all architects as one of the best examples of modern Gothic in this country. On the northwest corner of 52d street is the wonderful early Renaissance Vanderbilt house, designed by the late R. M. Hunt. Next to the Vanderbilt house is another residence of substantially similar character, and when Hofstatter and Revillon built the two buildings, which together occupy the southwest corner of 53d street and Fifth avenue, they very appropriately caused their structures to be designed in a style generally conforming to the Vanderbilt house on the one hand and the church on the other. While the buildings in themselves are perhaps not as excellent as, let us say, the Alexander Building, they are nevertheless far more appropriate to this position than buildings of any other type would have been, and show a commendable deference to architectural order almost without precedent in New York.

It will be seen from the illustrations what an enormous growth and change have taken place from 23d street up, within the past few years, and regrettable as has been the monetary loss caused by the process, we cannot but feel that if the change is to be permanent, it has been worth while.

But who knows? Perhaps the next article I am called upon to write will be "From 59th street Up."


Joseph Building
Henry Otis Chapman, Architect

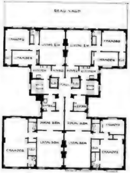

Alexander Building
Carrere & Hastings, Architects


Rusaits Building
7 East 48th Street
McKim, Mead & White, Architects

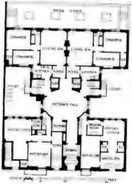

Detail of Lower Stories of Ritz-Carlton Hotel
47th Street and Madison Avenue
Warren & Wetmore, Architects


Frank Bros. Building
588 Fifth Avenue
Alfred Freeman, Architect

GENERAL VIEW OF EXTERIOR



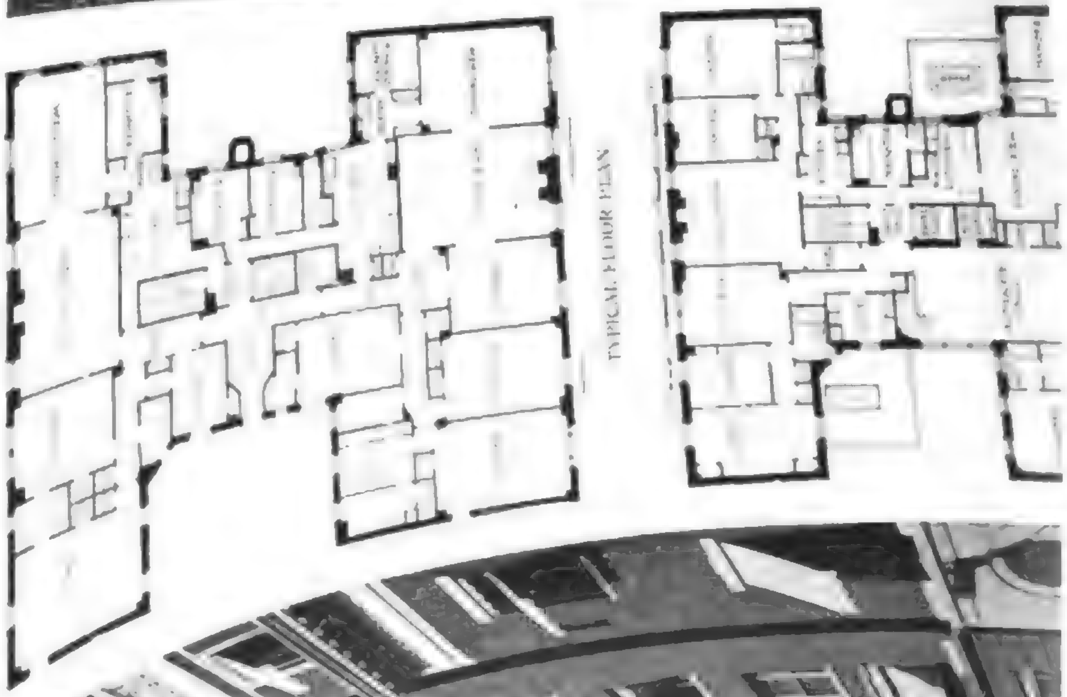
TYPICAL FLOOR PLAN



GROUND FLOOR PLAN

DETAIL OF LOWER STORIES

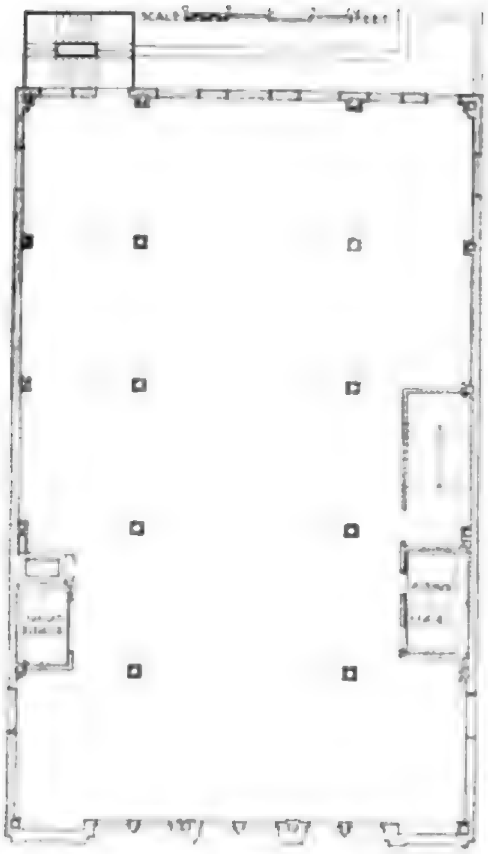
APARTMENT HOUSE, 15 WEST 55TH STREET, NEW YORK, N. Y.
WALLIS & GOODWILLIE, ARCHITECTS


TYPICAL FLOOR PLAN

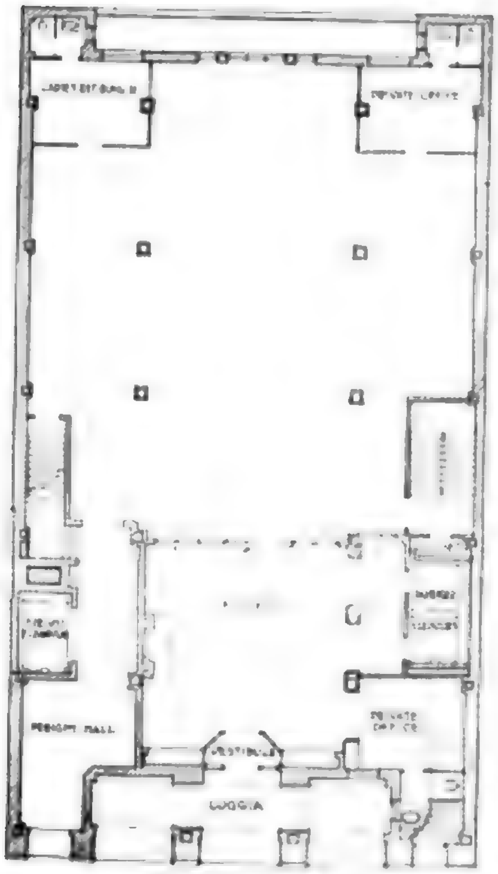
DETAIL OF LOWER STORIES

HAMPTON SHOPS BUILDING, EAST 50TH STREET, NEW YORK, N. Y.

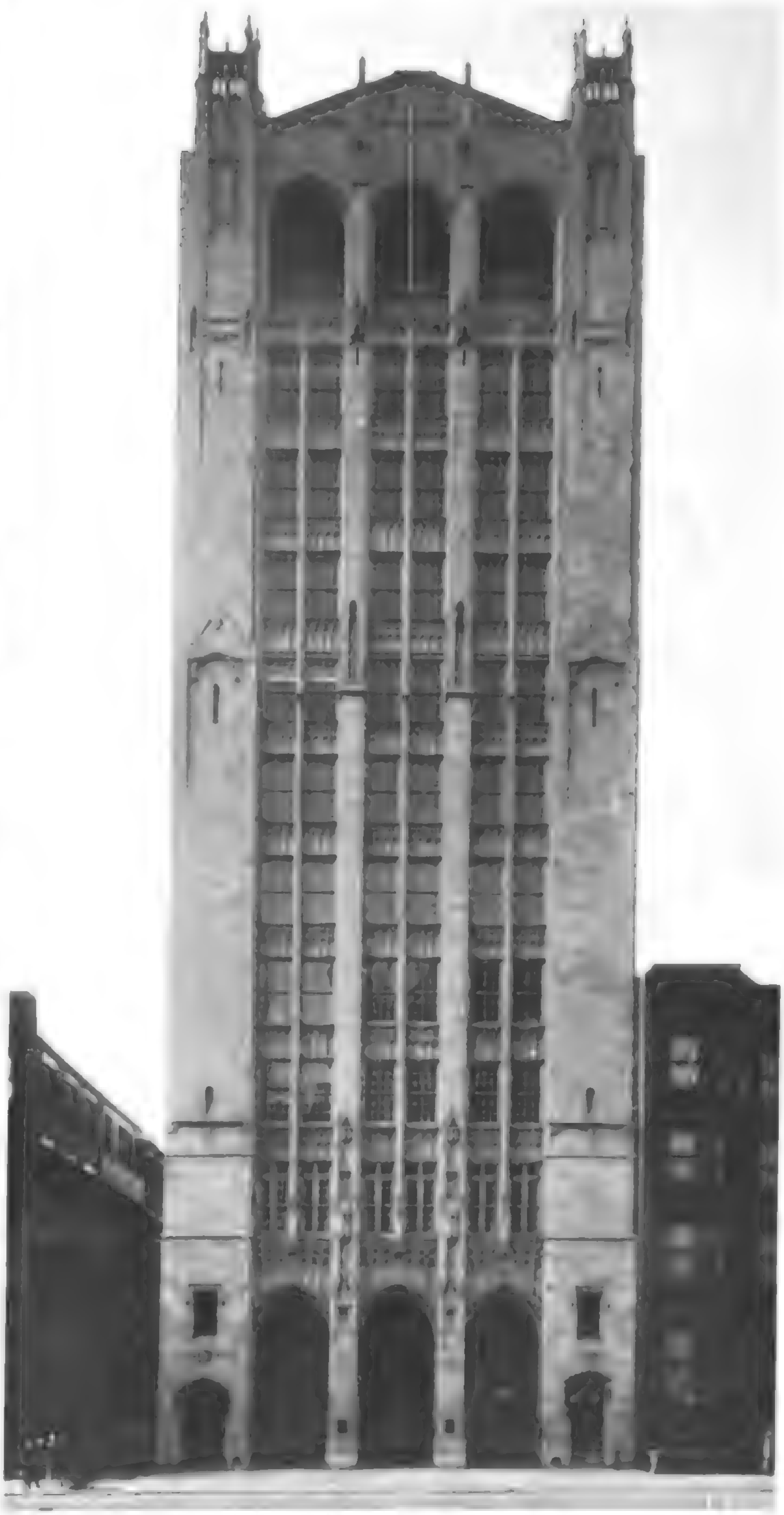
W. L. ROUSE & L. A. GOLDSTONE & JOSEPH L. STEINAM, ARCHITECTS



TYPICAL FLOOR PLAN



FIRST FLOOR PLAN

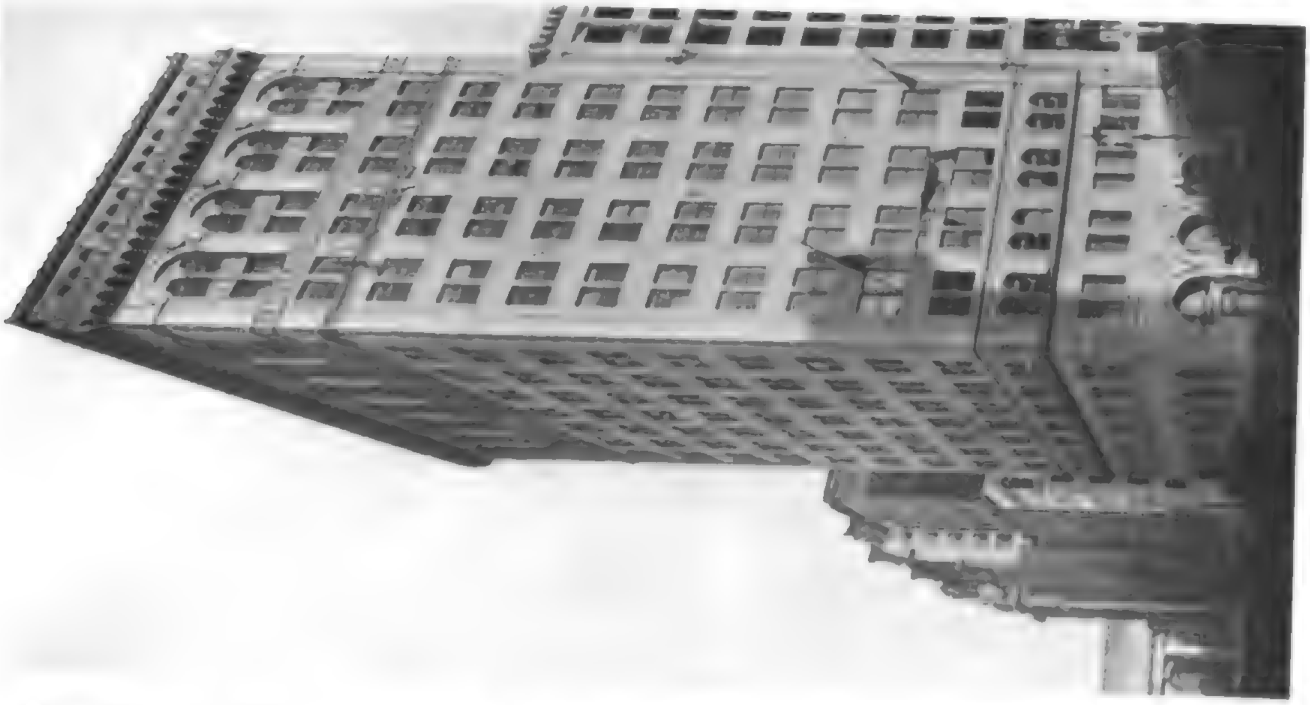


GENERAL VIEW OF ELEVATION

HAMPTON SHOPS BUILDING, EAST 50TH STREET, NEW YORK, N. Y.

W. L. ROUSE & L. A. GOLDSTONE & JOSEPH L. STEINMAN, ARCHITECTS

DETAIL OF UPPER STORIES
Reproduced at ¼-inch scale

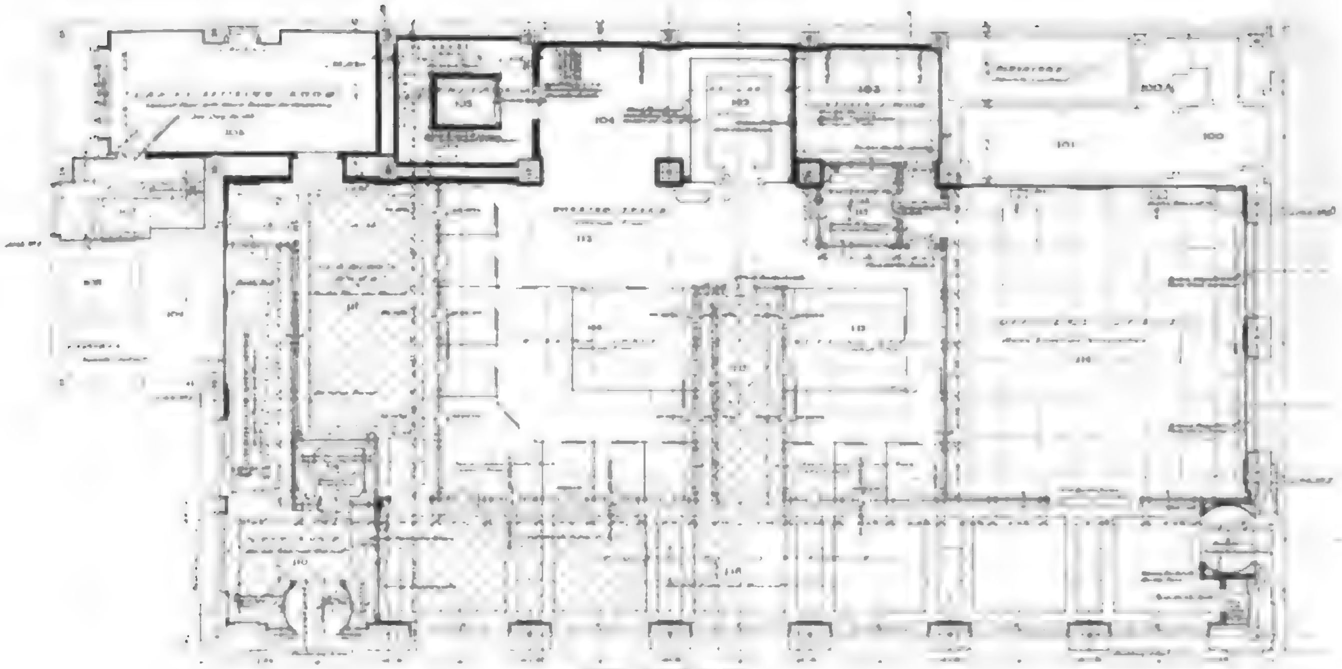


GENERAL VIEW OF EXTERIOR

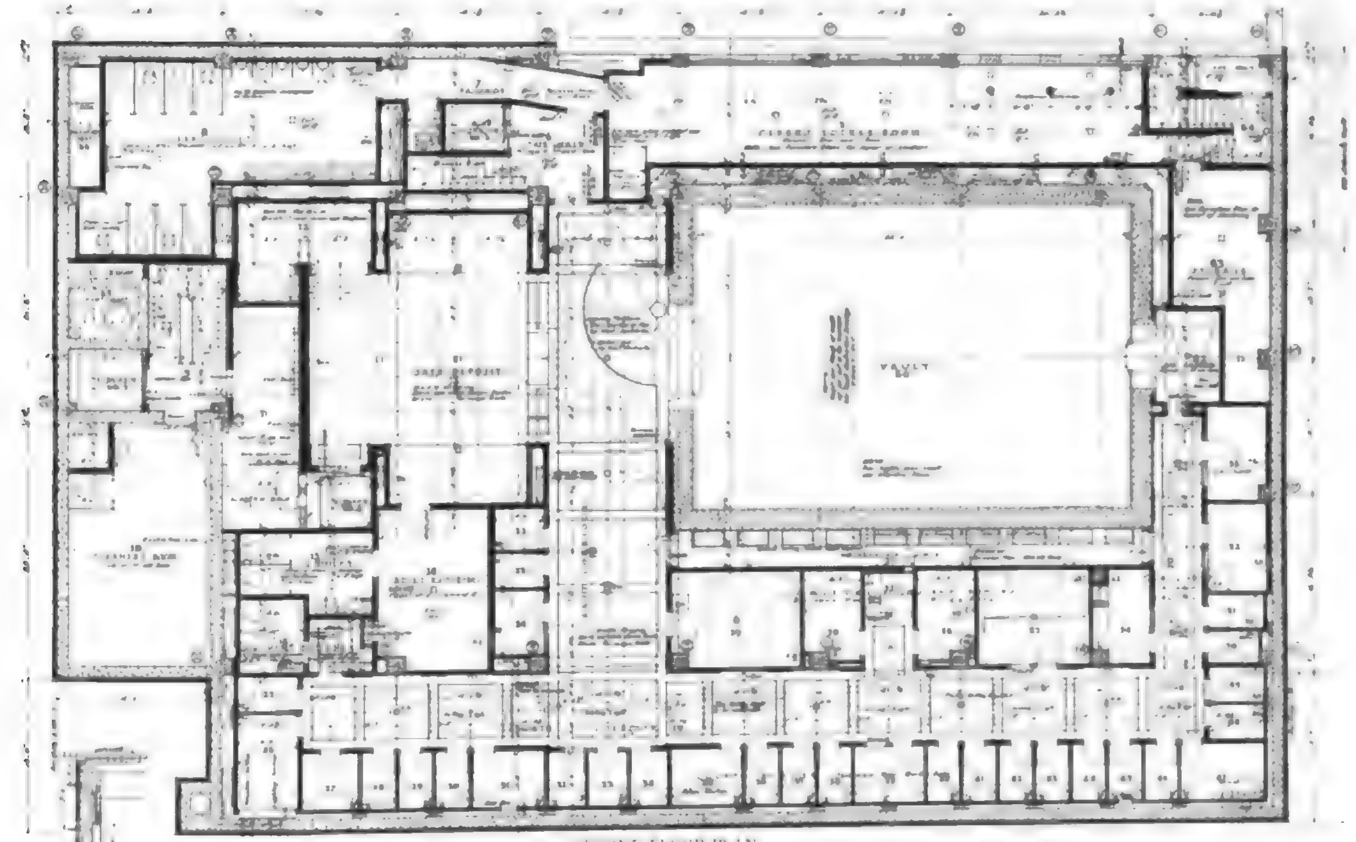
DETAIL OF LOWER STORIES
Reproduced at ¼-inch scale

POSTAL LIFE BUILDING, 43D STREET AND FIFTH AVENUE, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS



FIRST FLOOR PLAN
Reproduced at 1/16-inch scale



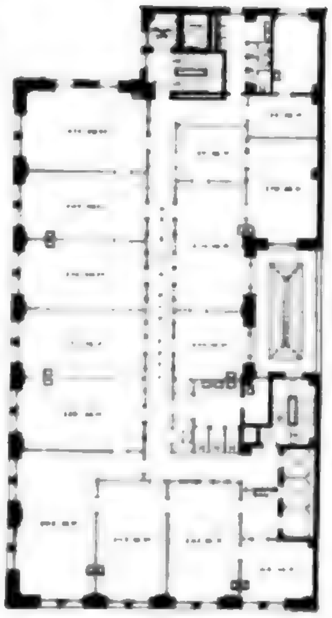
SECOND FLOOR PLAN
Reproduced at 1/16-inch scale

The above plans show the arrangement of the floors occupied by the Fifth Avenue Branch of the Guaranty Trust Company and the Guaranty Safe Deposit Company

POSTAL LIFE BUILDING, 43D STREET AND FIFTH AVENUE, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS

ENTRANCE TO BANKING ROOMS



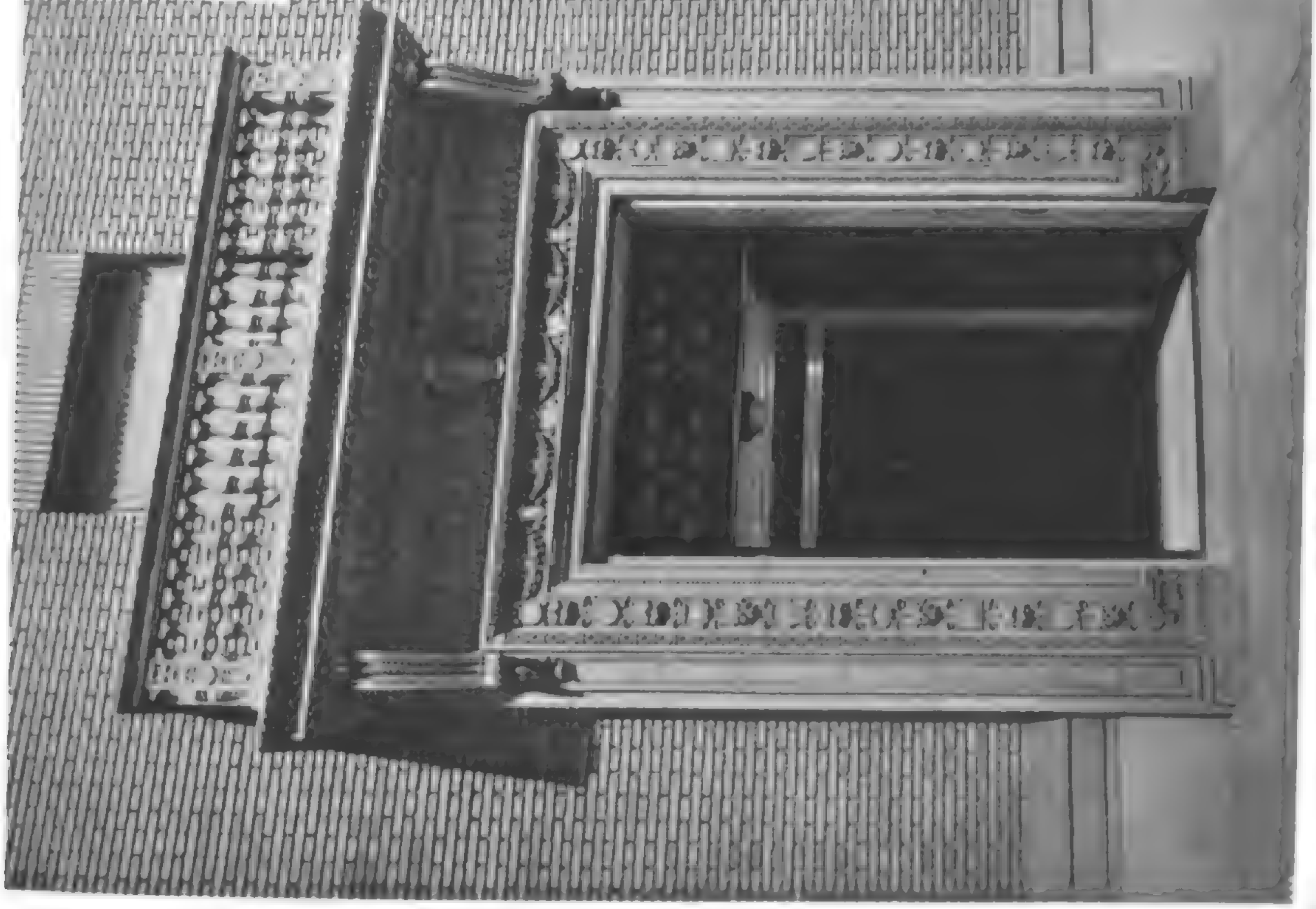
TYPICAL OFFICE FLOOR PLAN

DETAIL OF UPPER STORIES

POSTAL LIFE BUILDING, 43D STREET AND FIFTH AVENUE, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS

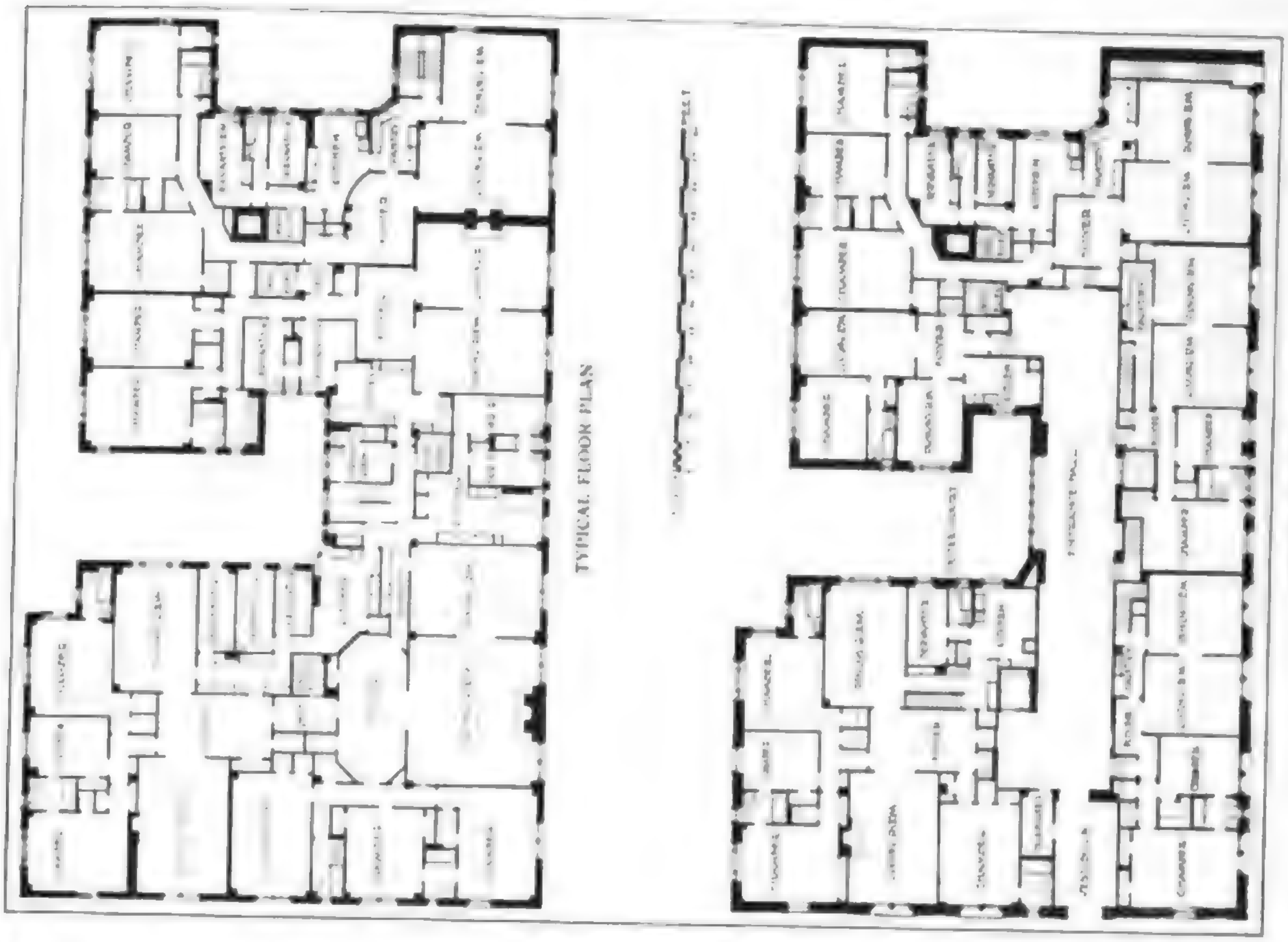
GENERAL VIEW OF EXTERIOR



DETAIL OF MAIN ENTRANCE

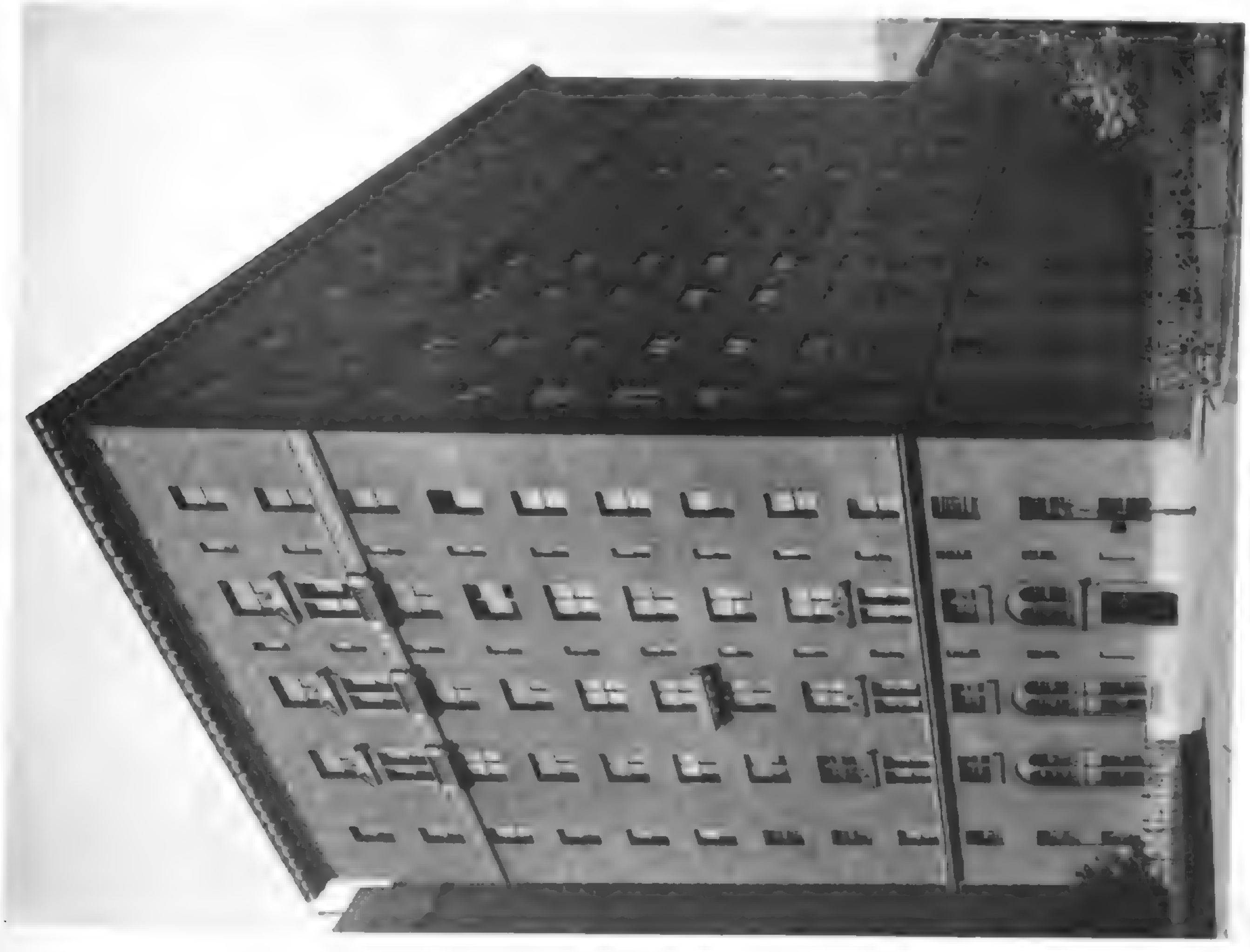
APARTMENT HOUSE, 960 PARK AVENUE, NEW YORK, N. Y.

D. EVERETT WAID AND J. E. R. CARPENTER, ASSOCIATED ARCHITECTS



TYPICAL FLOOR PLAN

FIRST FLOOR PLAN



GENERAL VIEW OF EXTERIOR

APARTMENT HOUSE, 850 PARK AVENUE, NEW YORK, N. Y.

W. L. ROUSE & L. A. GOLDSTONE, ARCHITECTS

VIEW OF ENTRANCE FRONT FROM DRIVEWAY

VIEW OF GARDEN FRONT

HOUSE OF HON. W. J. TULLY, LOCUST VALLEY, LONG ISLAND, N. Y.

KENNETH M. MURCHISON, ARCHITECT

DETAIL OF HOUSE FROM FORECOURT

DETAIL OF SERVICE END GABLE

HOUSE OF HON. W. J. TULLY, LOCUST VALLEY, LONG ISLAND, N. Y.

KENNETH M. MURCHISON, ARCHITECT

VIEW IN HALL LOOKING TOWARD VESTIBULE

SECOND FLOOR PLAN

INTERIOR OF ENCLOSED PORCH

FIRST FLOOR PLAN

HOUSE OF HON. W. J. TULLY, LOCUST VALLEY, LONG ISLAND, N. Y.

KENNETH M. MURCHISON, ARCHITECT

HOUSE OF TOWNSEND G. TREADWAY, ESQ., BRISTOL, CONN.
MURPHY & DANA, ARCHITECTS

DETAIL OF FRONT ELEVATION

HOUSE OF WILLIAM H. DAVIDGE, ESQ., WESTON, CONN.
MURPHY & DANA, ARCHITECTS

VIEW OF ENTRANCE FRONT

VIEW OF SIDE AND REAR

HOUSE OF WILLIAM H. DAVIDGE, ESQ., WESTON, CONN.
MURPHY & DANA, ARCHITECTS

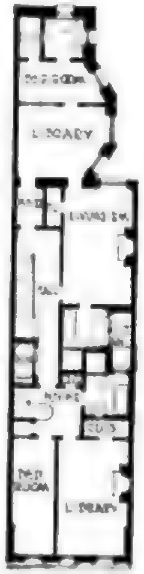
LIVING ROOM

DINING ROOM

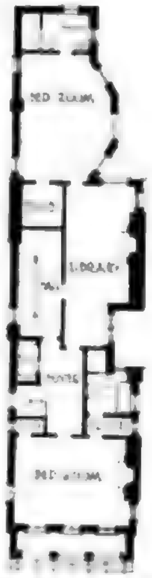
HOUSE OF WILLIAM H. DAVIDGE, ESQ., WESTON, CONN.

MURPHY & DANA, ARCHITECTS

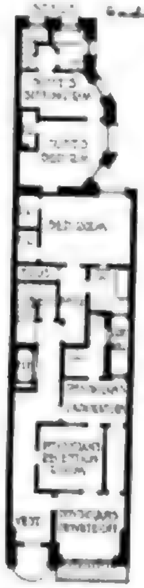
GENERAL VIEW



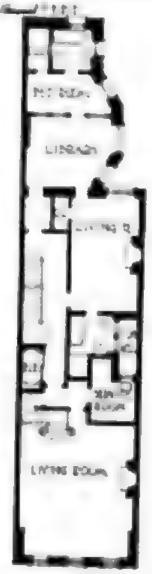
THIRD FLOOR



SEVENTH FLOOR



FIRST FLOOR



SECOND FLOOR

DETAIL OF ENTRANCE

KNICKERBOCKER CHAMBERS, EAST 62D STREET, NEW YORK, N. Y.
SAMUEL R. T. VERY, ARCHITECT

APARTMENT HOUSE, 930 PARK AVENUE
NEW YORK, N. Y.
SCHWARTZ & GROSS, ARCHITECTS

TYPICAL FLOOR PLAN

FIRST FLOOR PLAN

TYPICAL FLOOR PLAN

Two upper illustrations show plans of apartment house at right. Lower illustration shows typical plan of apartment house at left

APARTMENT HOUSE, 79TH STREET AND PARK AVENUE
NEW YORK, N. Y.
ROBERT T. LYONS, ARCHITECT

GENERAL VIEW

TYPICAL FLOOR PLAN

FIRST FLOOR PLAN

DETAIL OF LOWER STORIES

APARTMENT HOUSE, WEST 55TH STREET, NEW YORK, N. Y.
SOMMERFELD & STECKLER, ARCHITECTS

Decorative Plaster Work

PART II. THE WORK OF THE RENAISSANCE PERIOD

By A. D. F. HAMLIN

Professor of the History of Architecture, Columbia University

WITH the fall of Rome in the fifth century A.D. the art of the decorative plasterer seems to have sunk into a long eclipse. Throughout the Middle Ages, for over a thousand years, plaster was used only as a covering for rough masonry or a surface upon which to apply decoration in color either by painting or in mosaic. The possibilities of gypsum as a material for plastic decoration were unknown or ignored. The Roman ruins were despised and demolished, the substructions of the Golden House of Nero under the ruins of the Baths of Titus were abandoned to the bats or to the robbers who infested the once proud capital of the world. The soil above buried Pompeii had not been disturbed; her very existence was forgotten. The Early Christian, Byzantine, Romanesque, and Gothic styles of architecture which successively covered the lands of Christian Europe with splendid churches, baptisteries, and cathedrals employed other forms of decoration than that of plaster-relief: fresco, mosaic, marble-incrustation, carving, and stained glass. Only in the Mohammedan world did plaster work find favor, especially in Persia. There the abundance of clay and the general use of brick for building brought about the development of an external decoration of encaustic tiles and an interior decoration in part by tiles and in part — especially in the ceilings — by plaster. The late R. Phené Spiers of London — whose recent death has removed one of the most versatile and brilliant of English scholar-architects — has pointed out the important part played by the Persian workers in brick and plaster in the development of Moslem "stalactite" work. This curious and almost bewildering form of decoration by geometric units spread as early as the thirteenth century throughout the Moslem world from Persia to Spain and even to India eastward, to be executed often in carved marble, as well as in plaster.

Plaster Decoration, Hall of Two Sisters in the Alhambra, Granada, Spain

It was in Spain, indeed, that the most striking use of stucco for decoration was evolved. The Moors of Spain developed this use — derived from that which prevailed in North Africa — into the splendid and showy adornments of the Alhambra and Generalife at Granada, the Alcazar of Seville, and the later parts of the "Mosque" at Cordova and the "House of Pilate" at Seville. In these buildings the spandrels and wall spaces were covered with the most intricate diaper-work in plaster of Paris or hard stucco, the pattern being brought out by the use of brilliant color and gilding. Whether these patterns were cast in separate pieces which were later set in place, or were stamped upon and into the wet plaster on the wall, I do not know. Probably both methods were employed as occasion demanded.

It was not until the sixteenth century that *stucco duro* or hard moulded plaster came into use for artistic decoration in the Christian world, and it was in Italy that the long-forgotten art was rediscovered and revived. Throughout the fifteenth century it had been the custom of the Italian sculptors to make replicas of their works in various plastic compositions, and to color them while the composition was still wet. Thus Donatello is said to have mixed lime, pounded brick and glue, in which composition he modeled a number of works. Plaster as a material on which to execute mural paintings in fresco had long been in use; the glorious school of Giotto and the Giotteschi had created a new art by its use, and their work had ushered in the whole Renaissance movement in painting. But the two elements — plastic modeling and decorative painting on plaster — had never yet been brought together. For their marriage the labors of many hands and minds were necessary.

In 1488 or thereabout the Cardinal Giovanni dei Medici of Florence, son of Lorenzo the Magnificent, and a connoisseur and collector of antique art, employed a certain Luzzo or Morto da Feltro to make excavations and researches among the ruins of Rome. In the course of these researches Luzzo explored the ill reputed "Grottoes" under the ruins of the Baths of Titus, and was fascinated by the beauty of the painted decorations on the piers and vaults which formed the substructions in part of

Plaster Decoration of the "Loggie," Vatican, Rome

the Golden House of Nero and in part of the Baths of Titus. To him Vasari gives the credit of the revival of the art of painting "arabesques and grotesques," based upon the light and fanciful decorations of these "Grottoes." A pupil or relative, Andrea di Cosimo dei Feltrini, is claimed by Vasari as the inventor of "sgraffito" decoration. As this is not painting, but a manipulation of the plaster itself, it deserves a few words of explanation. Upon the first rough coat of the exterior wall the plasterer spreads a coat of *intonaco*, a brown lime plaster colored by an admixture of charcoal or straw ashes. When this has hardened, a thin coat of fine white stucco or lime plaster with an admixture of plaster of Paris or marble dust or both is applied, and the decorative pattern etched through it with a stylus or graving iron. Sgraffito is practised to this day in Italy, especially in Florence and Rome. It is capable of very fine effects, and there is no reason why, in regions where frost and dampness do not prevail, it should not be introduced into our American practice.

Some twenty years after the discovery of the Grottoes by Morto da Feltro, Raphael was called to Rome by the Pope, Julius II, upon the advice of the architect Bramante and commissioned to decorate certain parts of the Vatican. Here the young painter, twenty-five years of age, came under the influence of the antique and was fascinated by the remains of Roman decorative art. With his assistant, Giovanni da Udine, he visited the now famous Grottoes again and again, and absorbed to a marvelous degree the spirit and character of their decorations. He resolved to apply his new-found knowledge in the decoration of one story of the arcades of the Court of San Damaso, built by Bramante, and Giovanni was directed to fathom the secret of the *stucco duro* in order to combine low relief with color, as the Romans had done. It is, then, to Giovanni da Udine that we owe the revival of the old Roman technic of stucco relief, as it is to Raphael and da Feltro together that the revival of the Roman conception of "arabesque" design — that is, the fanciful mixture of natural and conventional forms in graceful and flowing decorations — is due. The "Loggie" of the Vatican, as the arcades of San Damaso are called, with all their faults of scale — the faults of a pioneer overflowing with enthusiasm — are a monument of creative design, exquisitely beautiful after more than four centuries, never surpassed even by masters more thoroughly trained in architecture than the young Raphael.

The design of the never completed Villa Madama is ascribed to Raphael. Certain it is that the noble entrance hall, with its vaulted ceiling and three recesses, was decorated by Raphael's assistant, Giovanni da Udine, and his most noted pupil, Giulio Romano. These decorations are among the most prized monuments of the Cinquecento, and casts from them are to be found in many of the world's museums. There is more architectural vigor and more variety in these decorations than in the Vatican Loggie; perhaps less of the peculiar delicacy that invests all of Raphael's own work.

Giulio Romano carried his art to Mantua, where the Palazzo del Tè was decorated and partly reconstructed from his designs. From this time on the vogue of stucco as a material for interior decoration increased rapidly throughout Italy. Apparently there must have been toward the middle of the sixteenth century a greatly in-

Plaster Decoration in Francis I Gallery, Fontainebleau Palace, France

Interior of Vatican, Rome, Showing Decadence of Plaster Art

creased working of deposits of gypsum. At any rate, the use of plaster of Paris in decorative work increased with marvelous rapidity after 1550 or thereabout. The art was carried to Paris by Primaticcio (called by the French Le Primatice) and lavishly applied in the decoration of the famous Gallery of Francis I at Fontainebleau, under Serlio's supervision (about 1544). This Primaticcio had been employed at Mantua to continue and complete the work of Giulio Romano in the Gonzaga Palace. Giulio's and Raphael's assistant, Giovanni da Udine, who had completed the work begun or designed by Raphael in the Vatican, was employed in Florence and Venice and perhaps also on the exquisite decorations of the vault of the Piccolomini Library in Sienna Cathedral. He returned later to Rome and decorated the upper range of the arcades of San Damaso, above the Loggie; but plaster relief plays a quite unimportant part in the work of these upper arcades.

Another of Raphael's pupil-assistants, Pierino del Vaga, introduced the art of *stuccatura* into Genoa, founding an atelier there which continued after his return to Rome. The number of skilful artists in stucco increased rapidly. An extremely prolific worker in this line was Alessandro Vittoria (1525-1608), who labored especially in Venice and the near-by cities of Padua and Verona.

By 1550 the Italian art of *stuccatura* had spread through northern Italy and southward to Naples, and was practised by a host of artists of all grades of skill. It had already begun to lose something of its early refinement and exquisite delicacy, while taking on, with all the arts connected with architecture, more of the monumental quality. Owing to the cheapness and facility of its working it now began to take the place of carved marble and stone, and was increasingly used for ceiling decoration. In this function it rapidly grew in popularity, for by its means a massive masonry vault, richly carved, could be simulated in lath and plaster; while a deeply paneled or coffered ceiling could be produced by the same means without heavy timbers and costly wood carving.

This enlargement of the applications of plaster and stucco had various results, both good and bad. It greatly augmented the decorative resources of architecture. Many effects that had formerly been possible only at the cost of massive construction and expensive carving in marble, stone, or wood could now be produced at relatively small cost. The gain was great in the direction of internal splendor. So far as decoration may be considered purely as a matter of design, form, and color, without reference to material or structural significance, the new splendor was worthy of high praise. Distinguished artists bestowed their talents upon such decorations, and many of their works are greatly admired to this day. If a ceiling is to be considered as merely the decorative cover of a room, it is as legitimate to conceal its real con-

Side of Banquet Room Showing Plaster Work, Farnese Palace, Rome

struction behind it as to cover a floor with marble, mosaic, or carpets. The question of propriety begins to enter, however, when one imitates the appearance of costly materials in a cheaper one. A beamed ceiling in plaster that simulates wooden construction, or a coffered ceiling that simulates a paneled vault of masonry is a sham, and can be justified only by a splendor which overbalances the drawback of pretense. From this point of view the later plaster-work ceilings were better than the earlier ones, because they departed farther from their prototypes in wood or masonry. Many others are really decorations of true vaults, like the splendid barrel-vault paneling of the nave of St. Peter's, the ceiling of the Camera della Segnatura, or that of the Sala Reggia of the Vatican.

When, however, the fatal facility of plaster led to its use for monumental decorative sculpture, the rapid descent began toward the extravagant shams of the Baroque and Jesuit styles. Lorenzo Bernini (1598–1680) was probably the principal initiator of this movement. A vastly clever sculptor, extraordinarily prolific and an avowed imitator of Michelangelo, he outdid his exemplar in the dramatic attitudinizing of his decorative figures and was in turn followed and outdone by a host of technically clever imitators and successors. A rapid decline in taste supervened, fostered in part by the activity of the Jesuit order in building churches of ostentatious splendor, in which artistic sensationalism and shams of every kind were freely used, and tricks of perspective and *trompe-l'œil* effects were encouraged. The acme of sensationalism and the very bathos of true art were reached in the colossal altar-pieces of painted and gilded stucco, with massive clouds of glory and angels and cherubs in the most acrobatic attitudes, suggesting an explosion of dynamite quite as vividly as the glory of the Divine Presence. The protruding arms and legs of acrobatic angels, precariously seated on the narrow mouldings of the archivolts, disfigure the majesty of St. Peter's. Stucco draperies held up by plaster cherubs in the Vatican may amaze the ignorant, but they grieve the judicious.

Meanwhile stucco-relief had also been applied to exterior decoration, at first in the half-serious, half-playful *casini* and other structures of suburban villas; later to the façades of palaces and churches. The *casini* of the Villa Pia by Ligorio; the Villa Medici by Annibale Lippi, and the Villa Borghese by the younger Martino Lunghi or by Olivieri (?); the famous water-organ in the Villa d'Este at Tivoli, and countless other examples in Rome, Frascati, and elsewhere illustrate various phases of this development. These works are pervaded by an increasingly Baroque fancy which takes the place of the classic restraint and refinement of the earlier works. The technical execution is always excellent, and the quality of the stucco, which is never a pure gypsum, is attested by its admirable preservation through nearly or quite three centuries.

The most famous palace-façade in stucco is that of the Spada Palace in Rome, in recent years occupied by the Italian Senate. It was erected in 1540, but its charming reliefs of figures, festoons, and other ornaments may have been of later date. The near-by house of the goldsmith Crivelli, built in 1510, also has elaborate stucco ornaments. During the second half of the sixteenth century the practice became general of executing in stucco the mouldings and window dressings of palaces built of brick. This practice is now nearly universal in all the Mediterranean countries for ordinary buildings. It spread thence into Austria and South Germany in the seventeenth century; Vienna especially abounds in stucco façades of the seventeenth and eighteenth centuries.

In more northern climes the elements are less kind to stucco exposed to the weather and it is therefore chiefly confined to interiors. In England there was developed,

Stucco Decoration in Court of Spada Palace, Rome

as early as in the reign of Elizabeth (1558-1603), a remarkably interesting art of ceiling-decoration in low relief. At first pendants, in semi-Gothic style, were frequent; but these soon gave way to a very charming and perfectly rational system of all-over paneling with mouldings in low relief and arabesques or other ornaments in the meshes of the paneling. Hundreds of these seventeenth and eighteenth-century ceilings exist today in perfect condition. The reader is referred to Bankart's interesting work, "The Art of the Plasterer" (Batsford, London, and Scribner's, New York), for abundant illustrations of examples of these early English ceilings.

Toward the end of the eighteenth century the work of the brothers Adam introduced a new element of classic refinement, which was reflected in this country in some of the ceilings of the end of that century (*e.g.*, in the Massachusetts State House by Bulfinch) and of the early nineteenth. It had affinities with the Louis Seize style in France, and marked a sudden reaction from the artistic license of the Louis Quinze, the Baroque, and the "Zopfstil" which had run riot in France and Germany, though it had appeared only sporadically in England. This was the last flickering of the Renaissance in plaster work, which soon fell into the hands of inartistic workmen controlled by purely commercial agencies.

I have skimmed over the mere surface of a great subject, and leave to Mr. H. Desmond Upton, in a following issue, the discussion of the later and more modern aspects of the art. Perhaps, slight as has been this sketch, it has suggested at least the past importance and the potential resources of an art which it is in the power of our architects and decorators to restore once more to the rank which belongs to it in the field of modern architecture and creative design.

Detail of Ceiling, Sizergh Hall, Westmorland, England

Ceiling from the Old Palace, Bromley by Bow, England

THE BRICKBVILDER COLLECTION OF

EARLY AMERICAN ARCHITECTURAL DETAILS

PLATE THIRTY-TWO

THIS house is termed the "Lafayette House," as General Lafayette was lodged and entertained in it on his last visit to Alexandria in 1824.

The designer of this house was especially fortunate in securing the fine proportions of the doorway and the rich effect produced in its setting in the brickwork. The shapes of the door panels and contours of mouldings throughout the doorway are excellent. The fluted pilasters supporting the moulded elliptical arch give the effect of great strength without clumsiness. The moulded nosing of the stone steps, so prevalent in Alexandria Colonial work, continues the scale of the doorway to the sidewalk.

DOORWAY OF THE LAFAYETTE HOUSE, ALEXANDRIA, VA.

Built between 1820 and 1824

MEASURED DRAWING ON FOLLOWING PAGE

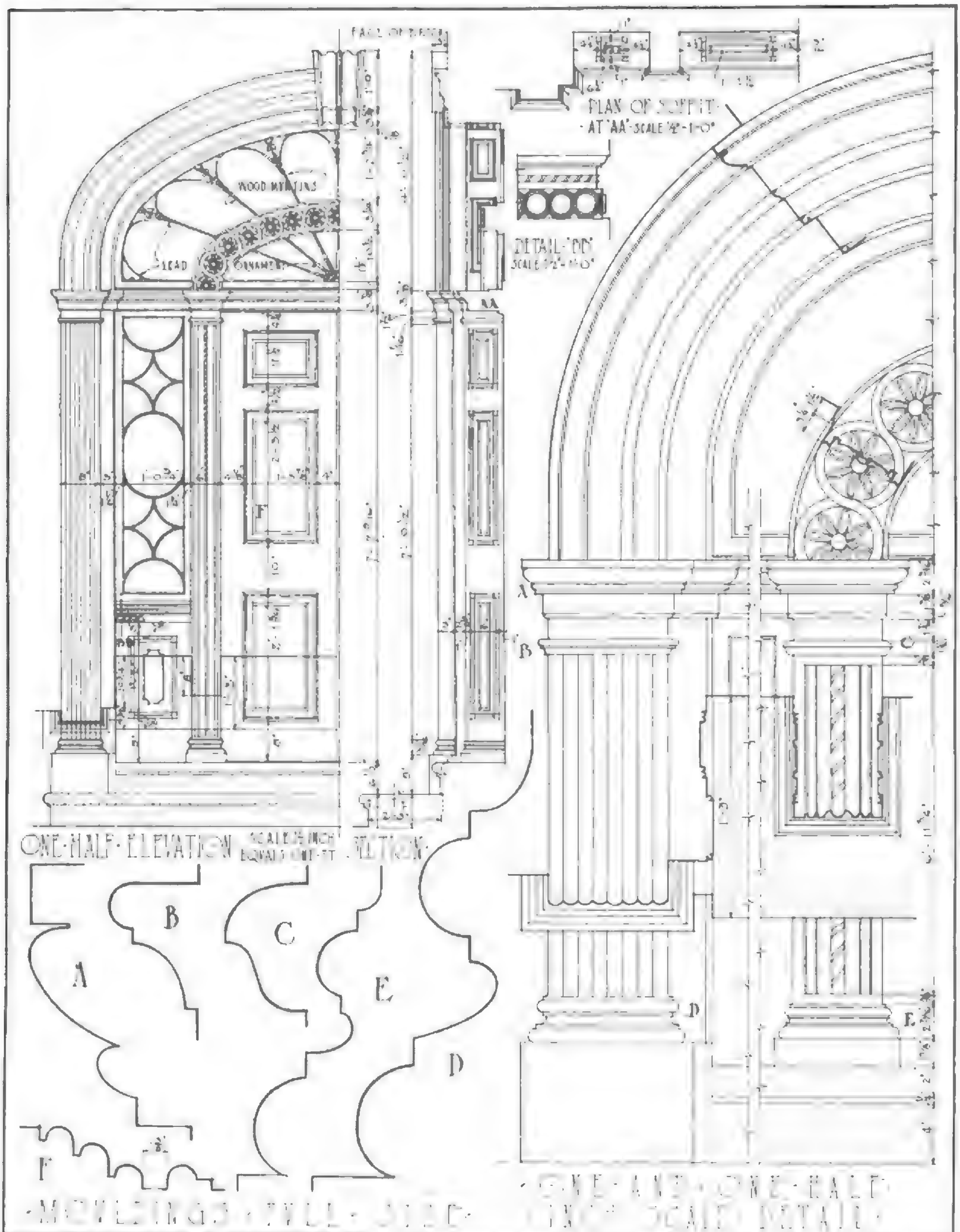


PLATE - 32 NOVEMBER 1916	·DOORWAY - LAFAYETTE - HOUSE· ALEXANDRIA VA DATE 1820-21 BUILT BY THOS LAWRASON	·MEASURED & DRAWN BY· J. F. KELSTER - O. J. MUNSON & J. WEBER

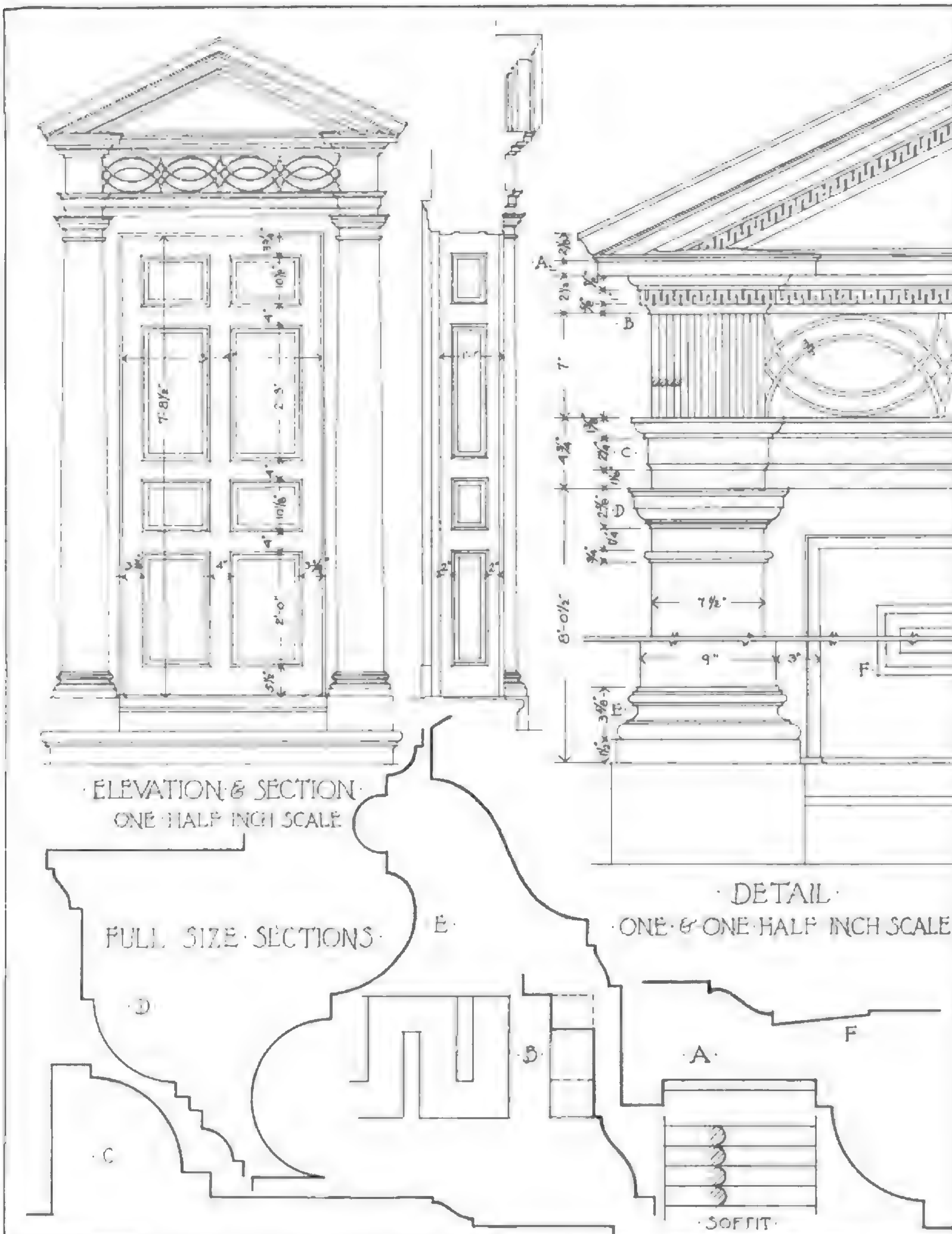


PLATE 33 NOVEMBER 1916	·DOORWAY·JOHNS·HOUSE· ·BUILT 1790 PETER JUSTIS·ARCHT·NEW·CASTLE·DEL·	·MEASURED & ·DRAWN BY ·RIGGIN BUCKLER·

PLATE THIRTY-THREE

THE Johns House was built in 1790 from the plans of Peter Justis of Wilmington, Del. The original plans and a quaint letter from the architect soliciting the work are preserved by the present owner. George Vansandt and Joseph Baldwin were the builders. The detail of this doorway might well have been taken from one of Pain's "Companions" or "Pocket Treasures" which were used by many of the architects and master builders of that period. Its proportions are graceful and in its mouldings and composition it is typical of the best in Colonial architecture.

DOORWAY OF THE JOHNS HOUSE, NEW CASTLE, DEL.

Built in 1790

MEASURED DRAWING ON PRECEDING PAGE

The Observations of a Draftsman

By FILUPO BRUNELLESCHI

ON the fourth floor of a rather old fashioned building in the city of New York is a suite of offices, the entrance door to which bears on its plate glass panel the name of one of the best known architects in the country. Inside is the usual arrangement of rooms — a public office where sit four or five stenographers, a finely equipped library, a private office haphazardly decorated with sketches, renderings, photographs and models, fragments of ornament, casts, books and magazines, bronzes and marbles, Persian rugs and ancient altar cloths and the thousand and one bits of detail that an architect picks up in the course of a long career. There is the file room where are hung the drawings of several hundred buildings, and finally the big drafting room which at times accommodates a score or more of men.

Here I have spent five years in service, five years in working over all the problems that come the way of a general draftsman in a fair sized office. There has been pleasure for me and there have been disappointments; there has been commendation — occasionally — for my efforts, and there has been censure — occasionally — for my errors. Whether I have deserved more of either than I have been given does not enter into this discussion. It is enough that I have reported at nine, done the day's work, gone home at five, and drawn my pay on Saturday — and observed.

It is with these observations that we have to do. I have seen the things that have made the office famous, and I have seen the things that have retarded its progress, hampered its success, and — from a purely business standpoint — lessened its profits. If the office were a marked exception from the general run of offices there would be little use in my writing this review, but I do not believe that to be the case, and it is with the hope that architects may read and perhaps profit thereby that I venture to set down my experiences.

It is difficult to discuss men without using names; therefore, for the sake of convenience, we will call the architect himself Smith, and his three lieutenants Black, White, and Gray. Mr. Smith — we sometimes call him the Governor — rarely used a drawing pencil except in the making of thumbnail sketches now and then, at which he was an amazingly rapid worker. His work was largely confined to the entertaining — the word is used advisedly — of clients, and parleying with contractors when the problem seemed too difficult for his subordinates to handle. Mr. Black might have been termed financial manager and general overseer of outside work; White was the designer, a Beaux Arts man, interested solely in the artistic side of his profession. Gray was head draftsman.

In the early days of my service I wondered at the amount of work that came into the office and the apparent ease with which it was secured, and I soon attributed it in a large degree to the personality of the governor. He was a thorough diplomat. An excellent conversationalist, educated, well read; he had that rare ability to talk intelligently and entertainingly with any man. I have frequently heard him say that to be successful an architect must be well versed in all branches of the fine arts; that a man who cannot appreciate good music cannot fully appreciate good architecture. He made friends easily and frequented clubs and societies where desirable acquaintances might be cultivated. To this, as much as to his professional ability, I laid his ability to get big commissions.

In the matter of getting out preliminary sketches he used a discretion that is sometimes lacking. For the real estate promoter who looked at all things from a cold business standpoint, plain business-like sketches were furnished, sometimes no more than rough plans colored in with a red pencil; but if the client seemed likely to be attracted by highly decorative drawings White was permitted to amuse himself for a day or two with water colors and gold tape.

Withal there were many things that a draftsman might have learned to his profit, but there were flaws, costly flaws, in the running of the office, and it is with them that I shall henceforth concern myself. Perhaps it is safe to say that we learn more from the errors that we note than from the successes that we observe without comment. The business was a success — that is to be admitted; but I soon learned that with better management the profits might be materially increased.

The greatest fault may be described as lack of teamwork among the powers that governed. A dozen times I have heard a new draftsman exclaim, "Who is the head of this drafting room?"

A man would be assigned to a new job. White would give him a few instructions and he would prepare his drawings under the occasional supervision of Gray. Then, when his work was well along, Black would look at it and straightway announce, "That's not the idea at all." Gray would be summoned, and forgetting the fact that it had been his job to keep his eye on the draftsman would join Black in criticism. The draftsman, nettled, would start again on a clean sheet, or "to save time" would spend half a day in erasing his innocent errors. Then, when he had finally satisfied the two lieutenants, Mr. Smith himself would saunter in, study the drawing and remark, "That's very pretty, but it's not right." Hours, days wasted because the triumvirate in command of the drafting room didn't know in the first place what was required.

How different from another office in which the head draftsman, now a member of the firm, made it his practice to devote an hour each day, outside of office hours, if necessary, in studying the requirements of the problems in hand, and then, the first thing in the morning, assuring himself that every draftsman understood exactly what his day's work was to be. Machine-like efficiency, perhaps, but worth while, and it may be added that the man was liked and respected by his subordinates.

The second flaw in our office management is illustrated by an incident which occurred when a number of new men were hired at a particularly busy time. We were

hard at work just then on a large bank building. At the same time we were preparing sketches for a Gothic church. Now it happened that several of us had had considerable experience in church designing, while one of the new men had come to us from an office noted for its banks. The logical thing would have been to put the new man onto the bank work and to permit one of us to make the sketches, which we could have done in a few days. What did happen was just the reverse. The new man was assigned to the church, and finding himself up against an unfamiliar problem was obliged to take two or three times as long as one of the rest of us would have required besides calling us in occasionally to help him. For him it was valuable experience, but for the firm a costly piece of mismanagement.

It was not long after this that it became necessary to rush through a set of drawings—"every drawing done by May first." When a week or more had gone by it became evident that the force of men then employed could not do the task in the allotted time. It could have been done if each man had put in two or three evenings a week, but we were not supposed to put in overtime except by request and we were not then requested. The firm decided to hire new men. Obviously a new draftsman, unfamiliar with his problem, will accomplish less in a given time than one who has worked on the drawings from the start. On May first the work was not completed, and it was decided to ask the men to work nights. Here again the policy of the office interfered with its work. Almost any draftsman is willing to do extra work occasionally, but when he is required to work nights he has a right to expect pay for it; if not "time-and-a-half," at least at his regular rate. In our office, however, we were seldom paid directly for overtime. Instead, we kept account of our time, and later, when the rush was over, we were allowed a vacation equivalent to the time we had worked. Fair enough sometimes, but there are times when a man needs the money more than he does the vacation. Moreover, it meant an actual loss to some of us; we were obliged to buy our suppers which meant an extra expense to those of us who otherwise would have gone home. We frequently found that in the course of a *charette* we were paying two or three dollars for the privilege of adding a few days to our vacations, perhaps three months hence.

It is an undeniable fact that a contented draftsman will produce more work and better work than one who thinks he is justified in finding fault with the conditions under which he is employed. Mr. Smith's men might have been divided into two general classes—the older men, men of eight or ten years' experience or more, and the younger fellows, boys of eighteen or twenty, still in their student days. That these younger draftsmen should be given every opportunity to develop their talents was perfectly fair, and the more experienced men were always ready to help them with advice and criticism, but sometimes we thought that the thing was being carried to extremes. The crisis came when one of the best men we had gave notice that he intended to leave. The Governor asked the reason for his sudden departure, and the reply was, "I have spent fifteen years learning to be a designer and I'll be hanged before I'll waste my time tracing foundation plans while the office boy does the designing." It may sound like a case of injured pride, but we all felt that the man was justified; even the office boy designer agreed with us—he had been given a task beyond his ability and he knew it. It was simply an example of the tactless method we had of assigning work, and it resulted in the loss of a valuable man.

Every office suffers from the failure of some of its draftsmen to appreciate the true value of their work. There is always the draftsman who omits structural details whenever possible on the supposition that the builder will know better than he does how to build them. Then there is the fellow whose ambition to produce a beautiful drawing so absorbs his attention that he loses sight of the fact that he is doing a detail for the sole use of a few workmen and not for exhibition purposes.

I recently saw a drawing made by just this sort of draftsman. It was a three quarter inch scale detail of an entrance to a public building. The man had actually drawn more than 8,000 individual bricks! What a wonderful exhibition of human patience and perseverance—but where was the head draftsman while the artist was thus amusing himself?

From my experience in trying to analyze the leakage of time and energy in Mr. Smith's office, I am inclined to believe that more time is wasted in the making of details than in any other way. The Governor frequently criticized us for our methods of making scale details. "Remember," he would warn us, "you are making that drawing for the metal worker; don't waste time showing wood, and plaster, and marble trim." We listened and obeyed, but we sometimes felt that his criticism was not well founded. One carefully drawn sheet showing all materials in their correct relations to each other would have been of more value to the contractor than half a dozen separate drawings and would have saved much of our time. What we were making was really a series of shop drawings which the subcontractors sooner or later made over in their own way.

The Governor seldom concerned himself with the interests of his men outside of office hours. The more ambitious of the younger fellows spent their evenings in the ateliers, and were cheerfully granted the use of the office library to aid them. Mr. Smith didn't take the stand that a few architects have taken, that a draftsman cannot work in an office during the day and study evenings without neglecting one or the other—or both. Atelier training was encouraged as something of material benefit to the office.

It is not the student whose outside work enters into my criticism, however; it is the draftsman who tries to build up a practice for himself while still an employee. In Smith's office we seldom accepted a job amounting to less than $15,000 or $20,000 unless the Governor felt obliged to do so for diplomatic reasons. Consequently when one of the draftsmen had a chance to do a small house or garage he didn't turn it over to the office but made the drawings himself in his spare time—a practice that the office not only countenanced, but to some extent encouraged. The men benefited by it not only financially, but they were getting excellent experience.

The danger of the practice, however, lies in the abuse of it, and in Mr. Smith's office it must be confessed certain of the men abused the privilege to a great extent. One man in particular had built up such a practice of his

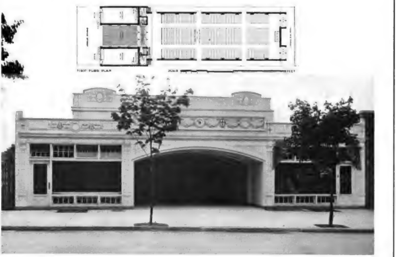
own that he was actually robbing the firm of work; schools, small theaters, and commercial buildings that ought to have been regular office jobs he captured under the very eyes of the Governor, and to crown the feat the man actually had the audacity to lug home office-supplies — paper, tracing-cloth, and pencils — wherewith to make his drawings.

I would not discourage the draftsman who can add to his income as well as to his experience and knowledge of the practical things in architecture by an occasional bit of work of his own, but to the architect who encourages the practice in his employees I would respectfully suggest that he watch out for the sort of man I have described — his genus is not rare — and if he finds him, either take him into the firm in self-defense or else part company with him.

I might go into numerous other topics; the way in which the head draftsman and the specification writer worked in utter independence of each other, a state of affairs which resulted in numerous discrepancies in plans, necessitating erasures and corrections; the Governor's habit of demanding the drawings on a given date and then ignoring them for a week or more, until we learned to discount his demands so that when he really wanted a drawing on time he had difficulty in getting it; and White's custom of permitting a draftsman to do sheet after sheet of ornamental detail as he pleased, and then blue penciling the entire lot, changing mouldings in their entirety until the draftsman in disgust was prone to tear up his work and start anew, whereas five minutes' criticism at the right time would have saved time and money.

I have wondered sometimes to what extent these unfortunate conditions exist in other offices. Smith's is not the only office that is losing money by mismanagement. A well-known architect has said that the ideal office is that in which there are no draftsmen; he may be right. But granting that draftsmen are sometimes necessary evils, the greatest possible efficiency can be attained only when the drafting room is under the supervision of one capable head man, and, if I may add one more condition, when the architect himself is in sufficiently intimate touch with his office to know whether or not his ideas are being properly carried out; whether, in short, his lieutenents are efficient directors.

I ask the architects who have been patient enough to read this article through to the end not to brand it merely a published grievance of a disgruntled draftsman; I have tried to make it a fair criticism from the standpoint of the employee. If only a few of the readers stop to ask themselves whether the criticisms enumerated in this paper strike home I shall consider my attempt justified.



MOTION PICTURE THEATER AND STORE BUILDING
LOGAN, NORTH PHILADELPHIA, PA.
ALBERT F. SCHENCK, ARCHITECT

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IN a recently issued statement, George B. Ford, consultant to the commission on building districts and restrictions in New York describes the new Zoning Law recently put into effect by a virtually unanimous vote of the Board of Estimate and Apportionment. Although in some individual instances this new law may work damage to isolated holders of property it is undoubtedly a great step toward placing the development of New York on a firmer and more rational basis than has previously existed. Its application and results will afford other American cities and all interested in the ideals of town planning a special opportunity to study municipal growth under proper restriction, but in considering its application to other centers it must be borne in mind that it contains many unduly liberal provisions, necessitated by the exceptional economic conditions of New York which, if adopted without change might tend strongly to defeat the object of the law in another community.

In general, the law will limit the height of buildings in proportion to the widths of the streets on which they face, all the way from two and a half times the width of the street in the financial district, through two times the width of the street in central Manhattan, with one and one-half times in the balance of Manhattan and in small portions of the other boroughs, down to once the width of the street throughout all the rest of the city. A future Equitable building could only be a third as high because it faces on narrow streets, but a tower in the center of it, half as large again as the Woolworth tower, might rise to any height. The Woolworth building on the other hand, if facing on a park, might be very nearly duplicated. Twelve and fourteen-story apartments will continue to go up on the main avenues, and eight and nine-story apartments on the side streets. Throughout most of the city, however, four or five stories will be the limit. Towers may be built to any height but they cannot cover more than a quarter of the lot. Mansards, dormers, and terraces are encouraged to bring light down into the streets by making the upper part of the buildings above a reasonable height set back from the building line.

The size of buildings will be controlled by the fact that the law requires certain open space on each lot. This again ranges all the way from the warehouse districts along the commercial waterfront and along the freight railways where a building may cover the whole of its lot, through the B, C, and D districts, so called, in each of which in succession a building must provide for larger and larger yards and courts, down to the villa districts where a house can cover only 30 per cent of its lot and must be widely separated from its neighbor on at least one side. Everywhere the courts have to be increasingly larger at the top as a building goes up in height, so much so that this requirement tends to limit the practicable economic height of buildings even more effectively than do the requirements directly affecting their height.

The location of buildings must be determined by their use — there are two general classes of restrictions; first, the districts which are restricted against business and industry of all sorts, the so-called "residence" districts; and second, the tracts which are restricted only against manufacturing and public stables and garages, the so-called "business" districts. In the former almost any kind of building that people live in is allowed, also churches, schools, hospitals, and various institutional buildings. In the business districts any residence use is allowed and even a certain small proportion of the unobjectionable types of manufacturing.

All of the balance of the city which is not in one or the other of these two kinds of districts is left unrestricted. It includes all of the land appropriate for industry along the navigable waterfront and along the freight railways, as well as most of the territory which is now given over to manufacturing. It includes also scattered throughout the city a number of blocks which are already invaded by public garages or which are appropriate for that use.

Despite the preponderating sentiment in favor of the plans as finally adopted and the almost unanimous feeling that districting was desirable, it was realized that the law or some parts of the zone maps might be taken into the courts. As the law will be administered under the police power of the state, without compensation to property owners when they may feel that they are damaged, the Commission felt that it was highly important that the law and the district lines should be such as the courts would be likely to uphold as a proper exercise of the police power.

In the various reports of the Commission nothing whatever has been said about the effect of the new law on the appearance of the city but within the next twenty-five or fifty years it is bound to make the city far more orderly and even more beautiful. Some have thought that it would spoil the glorious sky line of New York and rob the city of its "crowning glories." But so far from doing that, the sky line of New York in future years will be more wonderful than anything yet dreamed of, for the law is full of special provisions which are bound to encourage the erection of towers, dormers, terraced roofs of a variety and interest far different from anything which this country has yet seen. More immediately it will put order and harmony into the streets of the city, particularly those of the residential district.

Ultimately one of the greatest effects of all will be that on family life and citizenship, for as the character of the neighborhoods becomes assured families will begin to remain in one place instead of constantly shifting about as they do now. Local ties will be formed, neighborhood spirit will grow; social and community consciousness will develop and people as groups will take greater interest in the affairs, both social and civic, of their neighborhood.

THE BRICKBUILDER
AN ARCHITECTURAL MONTHLY

DECEMBER
1916

DEVOTED TO THE ART AND SCIENCE OF BUILDING

ROGERS AND MANSON COMPANY PUBLISHERS

LEON BATTISTA ALBERTI

BORN IN FLORENCE, 1404. DIED IN ROME, 1472. ARCHITECT OF CHURCHES OF SANT' ANDREA, MANTUA AND SAN FRANCESCO, RIMINI AND FACADES OF SANTA MARIA NOVELLA AND RUCELLAI PALACE, FLORENCE

// THE BRICKBVILDER

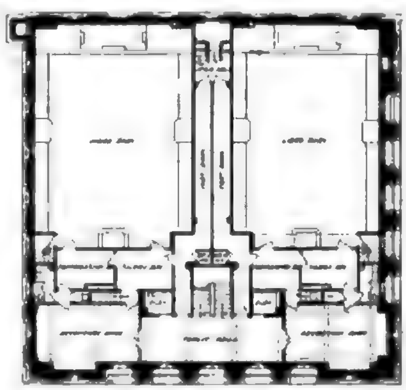
VOLUME XXV DECEMBER, 1916 NUMBER 12

Masonic Temples

By H. P. KNOWLES

THE town hall, the court house, and the post office are usually the most prominent, or at least the best known, buildings in the majority of towns and cities throughout the country, but next to these there is probably no building more familiar than the Masonic Temple. It is the meeting place of a large number of the local citizens who are usually representative of the best in the community, or at least of the more active.

An examination of the Masonic Temples throughout the country reveals the fact that this promising field of the architect has not received the serious attention and careful study which it deserves. Considering the number of these buildings erected, it is surprising how few are deserving of consideration on the ground of architectural merit; the majority are poorly designed, poorly planned, and badly ventilated, which criticism I might say applies more especially to the temples in the smaller communities. Despite the many Masonic Temples erected and the large sums expended on them, not until recent years has careful study been given to their designing and planning.



Lodge Room Floor Plan
Masonic Temple, Brooklyn, N. Y.
Lord & Hewlett and Pell & Corbett, Associate Architects

Like other structures of a semi-public character, they are almost invariably placed in the charge of a building committee, and the Masonic building committee, like the majority of building committees, is hampered at the start by the belief that the greater the number of designs submitted for its consideration the more likely it is to secure a building that will be satisfactory to the fraternity. Unfortunately many of these competitions have not been conducted under such supervision as would induce architects of standing to compete, and the results are almost invariably distressing to all but the successful competitor. This condition applies, of course, to the majority of similar building operations, but it seems as if the buildings of fraternal societies suffered more from this complaint than any other type.

Another reason that is largely responsible for the mediocre character of a large number of the Masonic Temples in the smaller communities is the custom of limiting the selection of an architect to one or two of the local members of the profession who are members of the lodge. The result, of course, is in strong contrast to the case of a town library, for instance, where the building committee is not limited to local architects for its selection and is free to go outside of the town for talent if the local supply is not deemed sufficiently experienced.

In common with most building committees, the first question which confronts the majority of Masonic Temple building committees is the everlasting economic one: first, the wherewithal to build; and second, the reliable flow of the wherewithal to keep the building going after completion. As usual with the preliminary work involved in erecting buildings that are designed to accommodate the many, the first question is over the site. With this settled, the debate as to the character of the building to be erected begins. It must be decided whether the structure is to be a purely Masonic building or whether it shall be partly commercial — say with stores or a bank on the first floor, or perhaps a story or two of offices in the lower floors with the remaining upper portion devoted to lodge purposes. The object of the stores and offices is to afford additional revenue which with the lodge rents will provide sufficient funds to care for the upkeep of the building without burdensome taxation of the lodge members.

The partly commercial and partly Masonic type of building appeals to many; but leaving out for the present any architectural consideration, the writer's experience leads him to believe that seldom if ever is a Masonic building committee which is subject to frequent change in its makeup successful in the management of a building when outside interests have to be considered. The average Masonic building committee, which as a rule only meets at stated intervals, is not suited to the proper care of a commercial building unless it secures the services of a competent superintendent capable of dealing with the tenants and who is available at all times to look after the interests of the building and its owners. The commercialism of such a structure robs it of that private homey or clubby atmosphere which is so essential to the successful housing of a Masonic lodge.

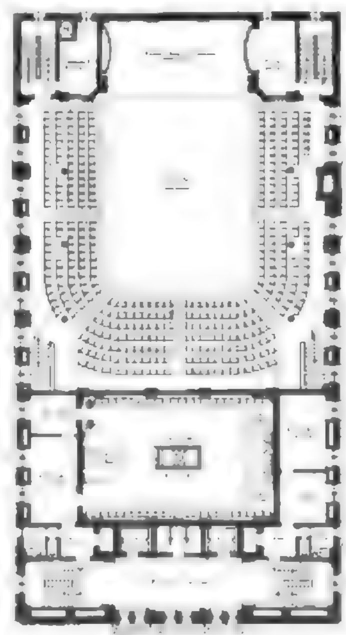
Some of the more recent Masonic structures have followed the more dignified type, that of a purely Masonic building accommodating only Masonic organizations. Such is the type of the new temples being erected in Yonkers, Schenectady, and Syracuse, N. Y., and Toronto, Canada, the latter being one of the largest and most important of the recent buildings.

A building designed to be used exclusively as a Masonic Temple should be dignified, of good proportions, built of substantial honest materials, and carefully planned to suit the purposes of the fraternity. This may well be said of any building, but it applies particularly to buildings of this class, and all those who are familiar with the teachings of Masonry and its lectures will appreciate how important this is.

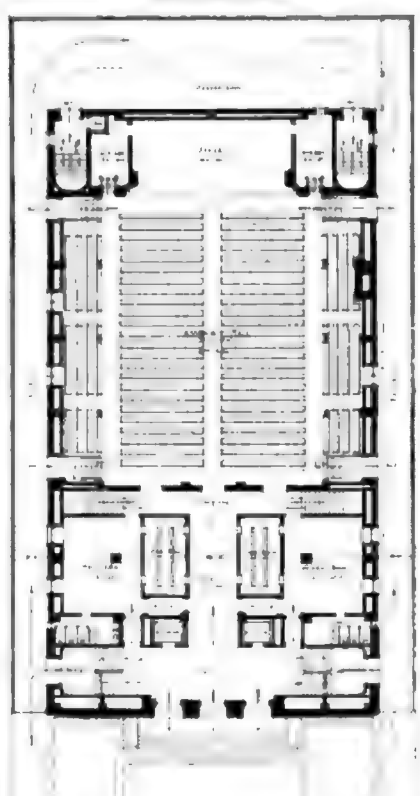
The semi-secret character of the organization and the fact that its meetings, or communications as they are called, are held in places where observation cannot be had by those not within the circle, must necessarily stamp the exterior of such a structure with a character quite in contrast with its neighbors.

Aberrations in the form of so-called Egyptian Temples have been erected to house the fraternity — buildings which look more like morgues or jails than the homes of an organization whose object is the uplift and betterment of its members. These forbidding structures are designed to emphasize the secret side of the order, giving the impression to the uninitiated that Masonry is a mysterious organization whose members participate in solemn rites and are bound together by oaths for some mysterious reason not to be divulged under the most awful penalties.

If such were its only attraction, the organization would not have existed until now, nor have wielded the influence it undoubtedly does. In reality the secret side of the order is the least important. There are obligations and signs by which one mason may know another, which are secret, of course; but as compared with the actual reasons for the order's existence, this aspect of it is insignificant and need not be considered any more in the external treatment of one of these buildings than would be the case with a club or any other similar structure where privacy is essential. The fact that few openings are needed in the outside walls and the necessary large height of the stories will stamp the building with a character sufficiently suggestive to indicate its purpose. The lodge rooms must, of course, be absolutely secure from any espionage, but the building need not be made to look like a morgue or a jail in order to guarantee this necessary privacy.



Second Floor Plan



First Floor Plan

Masonic Temple, Toronto, Ont., Canada

H. P. Knowles, Architect

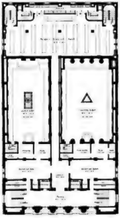
A word or two as to the meaning of Masonry may be of interest to those who have not been initiated. The Masonic fraternity came into existence several hundred years ago, but just when is a matter of discussion among Masonic authorities. The antiquarian will trace the origin of the trade unions of the Middle Ages and demonstrate beyond controversy that modern speculative Masonry is the direct lineal descendant of the traveling Masonic Guilds to which medieval Europe owes its magnificent cathedrals, monasteries, and abbeys. The philosopher will go farther and find the germ or dominant idea of modern speculative masonry in the "mysteries" or secret societies of antiquity; but undisputed records show the existence of ancient operative guilds, not unlike our modern labor unions except that they were secret in character, and only those who were in the possession of certain signs and words were able to enter their meetings. These guilds or lodges gradually developed into lodges of speculative masonry, and their doors were opened to any seeking admission who were "free born, of lawful age, and well recommended."

Masonry has been defined as a system of morality, veiled in allegory and illustrated by symbols.

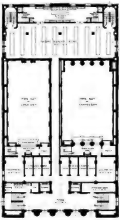
The organization has assumed large proportions, especially in English-speaking countries, although it has many adherents in almost every quarter of the world. It endeavors to spread the teachings of brotherhood, and the lectures and ritual contained in the various degrees through which the candidates must pass are so full of symbolism that the design of the temple, at least its detail, must surely bear its traces both on the exterior and interior.

It is a difficult matter to compare the home of such an organization to any other structure. It is not usually termed a religious institution, although it is founded on religious teachings. Its meeting places are not considered places of worship, although every lodge room must be furnished with an altar or pedestal on which is placed the Holy Bible, and prayers are said by the lodge chaplains and hymns sung by its members. It cannot be termed a club in the usual sense of the word, although it is an organization of men, membership in which

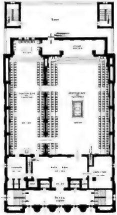
GENERAL VIEW OF EXTERIOR FROM PERSPECTIVE DRAWING



THIRD FLOOR PLAN



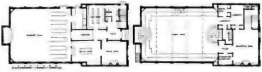
THIRD FLOOR MEZZANINE PLAN



FOURTH FLOOR PLAN

MASONIC TEMPLE, TORONTO, ONT., CANADA
H. P. KNOWLES, ARCHITECT

Front Elevation



First Floor Plan

Second Floor Plan

Masonic Temple, Everett, Mass.
Loring & Phipps, Architects

requires that its candidates shall be regularly proposed, and for which initiation fees are charged and regular annual dues are collected. The communications or meetings are held at regular stated intervals, usually twice each month. The proceedings are carried on in accordance with strict ritualistic form prescribed by the Grand Lodge authorities. This ritualistic form, with its obligations, passwords, grips, signs, etc., is secret.

Masonry is the oldest of all secret organizations, and the majority of modern societies which initiate members with ceremonies of a secret nature will be found to have modeled these ceremonies after those of the Masonic Order.

Masonry is primarily the lodge known as Free and Accepted Masons, and from this various branches have sprung which are sometimes called the Higher Orders, and in a community which boasts a lodge there will usually be found a Chapter of Royal Arch Masons, and in the larger towns a Commandery of Knights Templars. Another branch of Masonry is the Council, which generally holds its meetings in one of the lodge rooms of the Masonic Temple. There is also a system of degrees known as Scottish Rite Masonry. This branch of the fraternity will also be found meeting in the Masonic Temple, but in the larger cities it is usually housed in an independent structure of its own, a very notable example being the beautiful Scottish Rite Temple in Washington designed by Mr. John Russell Pope. The Mystic Shrine and Grotto, allied Masonic organizations, are found only in the larger cities and occupy buildings of their own constructed especially to suit their own uses.

The average Masonic Temple for a small city of about 100,000 inhabitants will usually require two lodge rooms to accommodate seven or eight lodges, a chapter room, assembly room, banqueting room, etc.

The assembly room is generally located on the ground floor so that it may be rented for outside purposes, and it must be so arranged as not to interfere with the comfort and workings of the Masonic bodies in the balance of the building; and it usually seats from five hundred to six hundred persons, and may be with or without a gallery. If the community possesses a commandery of considerable size, this assembly room may be used as an asylum for that body; but usually in structures of this size one of the lodge rooms is sufficiently large to accommodate the commandery. This assembly room is also used for many social affairs, such as lodge entertainments, smokers, etc., which are of frequent occurrence, and the room is generally furnished with a stage and dressing rooms. It is essential that the cloak room, retiring room, and toilet-room facilities should be ample and conveniently located.

In the larger temples, the lodges, chapters, commanderies, and Scottish Rite bodies are kept entirely separate in rooms of their own. In the Toronto Masonic Temple illustrated herewith separate quarters are provided for these various branches, excepting that the commanderies, or preceptories as they are called in Canada, and the Scottish Rite bodies occupy the same rooms on the top story.

The most popular dimensions for a standard lodge room are about forty feet wide, from sixty to sixty-five feet long, and about twenty feet high in the clear.

It has been computed that the average attendance at lodge meetings is about ten per cent of the total membership; but frequently on special occasions the attendance is greatly increased, and the lodge room should be sufficiently large to accommodate seventy-five per cent of the total membership of the largest organization occupying the room.

If the building is to contain more than one lodge room, they should vary in size. The largest room is usually placed on the top floor and is frequently arranged for commandery purposes as well as for the lodge. If possible this room should be surrounded with a corridor or promenade five feet wide, along which are niches or stations for guards necessary for the working of the commandery degrees or orders, as they are properly termed; along this corridor may be ranged the lockers for the Sir Knights' uniforms and other Templar equipment. The ideal layout

for this type of room will be found in a plan illustrated herewith, which will show the type of room required for a building which is to have one room in common for the lodges, chapter, and commandery as it is arranged to suit the requirements of all these bodies.

In connection with the large lodge room, if it is used for commandery purposes, there should be arranged a small room, or rather a large closet, say six feet square, called a Chamber of Reflection. This room must be made sound proof and should be located conveniently near the entrance to the main room.

The smaller lodge room is planned to meet the requirements of the smaller lodges. This room and the chapter room may be placed together on the second floor in a manner somewhat similar to the second floor of the Toronto Temple, omitting the banquet room in the rear.

The officers' stations in the lodge rooms are fixed and will be found the same throughout all jurisdiction: the master's station is on a platform at the east or main end of the room and is raised three steps above the general floor level; the senior warden's station is at the opposite or west end of the room, elevated two steps above the main floor level; the junior warden's station is placed in the center of the south or right-hand side of the room as one enters the room, one step above the general floor level. The minor officers of the lodge are placed on the main floor level; the senior deacon to the right of the master; the marshal to the left of the master; the senior and junior masters of ceremonies to the right and left of the senior warden; and the senior and junior stewards to the right and left of the junior warden. The junior deacon is placed at the entrance door on the lodge room side, and the tiler at the outside of the entrance door in the tiler's room. The master's platform should be sufficiently wide to accommodate a chaplain and a half dozen visitors. The treasurer and the secretary of the lodge are usually placed in the two corners at the master's end of the room, the treasurer on his right and the secretary on his left. The three principal stations are designated by emblems, or jewels as they are called; the master by the square; the senior warden by the level; and the junior warden by the plumb.

Music is considered essential for the working of degrees and for the ceremonies attending the opening and closing of the lodge sessions; therefore every lodge room should be furnished with an organ, and it will be found to range from a modest little affair standing in one corner of the room to a two or three manual pipe organ. The organist and manual are usually placed back of the senior warden's chair and the organ chamber overhead on the mezzanine floor level.

Over the master's chair in every lodge room is suspended an illuminated letter "G," while in the center of the room on the main floor level is the altar which consists of an oblong structure about three feet wide, three feet high, and five feet long, surrounded with a kneeling step six or seven inches high. To indicate symbolically three points of the compass — east, west, and south — three candlesticks on standards are placed around this altar, two on the left and one on the right-hand side. The altar and these candlesticks are frequently set in a marble or mosaic panel set flush with the floor. This panel, or trestle board as it is masonically termed, is usually about six feet wide and about twelve feet long and is surrounded by an ornamented border which is of symbolical significance, and in the center is placed a "blazing star."

A switchboard controlling all the lighting of this room should be located inside the lodge room near the entrance door at the junior deacon's station, as he usually has control of all the lights. In addition to the


Second Floor Plan


Masonic Temple, Colon, Panama
H. P. Knowles, Architect

usual switches for the control of various groups of lights, there must be one switch which will throw out all lights in the room excepting the lights on the candlesticks around the altar, and these are usually provided with gas outlets.

There should be two entrances to the lodge room, both to be placed at the rear end of the room on either side of the senior warden's station: the one on the right of the main entrance is for the initiated members of the fraternity, and the one on the left for the entrance of candidates. On either side of the candidates' doorway on the lodge room side are usually placed two symbolic columns surmounted by spheres, and these columns to be symbolically correct must be Egyptian and in accordance with the biblical description of the columns outside the doorway to King Solomon's Temple. These columns are familiar to most readers, as they are frequently located on the exterior at each side of the main entrance.

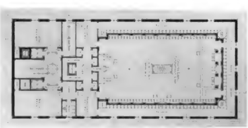
Interior of Lodge Room in Masonic Building, New York, N. Y.
H. P. Knowles, Architect

Where a gallery is placed in the lodge room, access to it should be from the lodge room only or from a vestibule at the entrance to the lodge room arranged in such manner that it can be entered only by those who have passed the inspection of the tiler at his station immediately outside of the lodge room entrance door. The organ loft or any portion of the mezzanine space which looks into the lodge room must be similarly arranged and should have no entrance on the mezzanine floor.

The chapter room may be of dimensions similar to the standard lodge room. The candidates' preparation room, however, should be larger than that of the lodge room, as more candidates may be initiated at one time in this branch of the order.

In the chapter room there should also be constructed, either in or adjacent to the candidates' room, a well about four and one-half feet square and from twelve to fifteen feet deep, which is entered from the top by means of a trap door placed flush with the floor of the candidates' room, or in a smaller room adjoining. This well should be furnished with paraphernalia peculiar to the chapter degrees and is usually installed by members of the chapter.

The altar in the center of the chapter room is triangular in shape instead of rectangular, as in



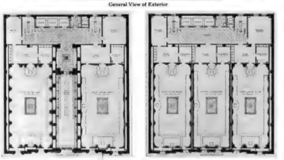
An Ideal Lodge Room Floor Plan

Interiors of Lodge Rooms in Masonic Temple, Salem, Mass.
L. S. Couch, Architect; Little & Browne, Associate Architects

the case of the lodge room. A number of electric outlets should be provided in the floor, the base, and ceiling, in addition to those required in the lodge room.

The public halls and corridors in the lodge room floors should be laid out with liberal dimensions, as they are used for a common meeting ground by the members of different bodies meeting at the same time. Many members visit the temple for social intercourse and may spend little time in the lodge room, but devote most of it to smoking or chatting in the anterooms or the adjacent corridors. These halls and corridors, therefore, should be as spacious as possible and arranged for lounging purposes.

General View of Exterior



Lodge Room Floor Plans

Masonic Building, West 24th Street, New York, N. Y.
H. P. Knowles, Architect

The lodge anterooms are grouped around the entrance end of the lodge room and this portion is usually two stories high, affording a mezzanine over these anterooms.

The candidates' preparation room is usually furnished with lockers for the use of the candidates.

The tiler's room, which is in reality the entry to the lodge room, need not necessarily be large; about twelve by sixteen feet is ample for the average tiler's room. It is usually furnished with lockers and drawers—about one or two large drawers and one or two lockers or small cupboards for each lodge, chapter, or other Masonic body occupying the room. These are under the direct charge of the tiler and in them are kept hymnals, gloves, aprons, and smaller pieces of paraphernalia, such as gavels, symbolic working tools, etc.

Beyond the tiler's room and well separated from the lodge room should be placed a parlor for the use of members during intermissions.

There should also be a committee room, although this is not infrequently placed on the mezzanine floor over the lodge anterooms.

If it can be arranged, it is well to provide each meeting room with its own separate toilet room. The average lodge room requires a toilet room with about two toilets, two urinals, and a wash basin, and located near this toilet room should be a liberal sized hat and coat room.

On the mezzanine over the anterooms are placed committee rooms, storage and paraphernalia rooms, and an examination room. The paraphernalia room is usually fitted with various sized closets with shelving and spaces for banners, staffs, flags, costumes, etc., and each of the organizations meeting in the lodge room below is entitled to one or more of these closets for the storage of its paraphernalia, so that the number of closets is governed by the number of organizations they are intended to serve.

The examining room is used for the examination of visitors and is usually the size of a small committee room.

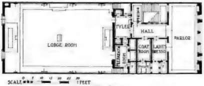
An essential feature of a modern Masonic Temple is the banquet room, which is usually located in the basement with the kitchen. It should be capable of seating two or three hundred persons, and in order to accommodate organizations of various sizes the room should be so arranged that it can easily be subdivided.

A very important consideration in the construction of these buildings is that the main meeting rooms, the lodge room, chapter room, commandery room, assembly room, etc., should be as nearly sound proof as possible. Various methods familiar to all architects may be used, but it has been found that in fireproof structures the doubling of the partitions, leaving a small air space between and furring the ceilings down, have been suffi-

ciently effective; but conditions, of course, must govern the proper solution of this problem.

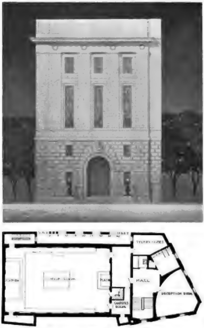
Every Masonic Temple should be furnished with a vault or safe room. When the building is to be used as the headquarters of the State Grand Lodge, a vault must be furnished for the storage of the Grand Lodge paraphernalia and jewels, while each lodge should be furnished with a small fireproof compartment for the storage of its records, jewels, and valuable papers. In large temples a safe room is usually constructed in which are installed steel compartments similar to a safe deposit vault.

In communities where there are two or more Masonic organizations, a Masonic Club is also found to exist, and the local temple usually provides quarters for this club. These quarters are fitted up with all the usual club facilities for amusement, together with a library and reading room and accommodations for a caterer. These rooms are generally placed on the top story or in the basement.



Second Floor Plan

Masonic Temple, Des Moines, Ia.
Frank E. Wetherell, Architect



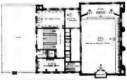
Elevation and Typical Lodge Room Floor Plan

Masonic Temple, Yonkers, N. Y.
Vollmer & Beersman, Architects; Evarts Tracy, Associated

The Masonic Temple in Brooklyn, designed by Messrs. Lord & Hewlett and Pell & Corbett, Associated Architects, is undoubtedly one of the most successful in the country both from an architectural as well as the Masonic utilitarian viewpoint. This building has been published so frequently that we will not again reproduce it; but the typical lodge plan is here repeated and needs only a glance to see its beauty. Simple in arrangement with proportions carefully studied, it is without question one of the very best illustrations of the ideal Masonic Temple lodge plan.

The Masonic Temple in New York is of the skyscraper type, and unfortunately, owing to conditions which confronted the fraternity at the time of its erection, space was necessarily limited, with the result that the building is somewhat crowded.

There are probably more lodge rooms in this building than in any other structure of its kind in the world. It has twelve lodge rooms accommodating one hundred and forty-four organizations; a grand lodge room seating twelve hundred and used for Grand Lodge annual conventions, assemblies, and large Masonic functions; Masonic Club quarters on the top of the building and



THIRD FLOOR PLAN

SECOND FLOOR PLAN

FIRST FLOOR PLAN

BASEMENT FLOOR PLAN

GENERAL VIEW OF EXTERIOR

CHAPTER ROOM

EASTERN STAR ROOM

CUMBERLAND LODGE, MASONIC TEMPLE, NASHVILLE, TENN.
ASMUS & NORTON, ARCHITECTS

executive offices for the Grand Lodge of New York State on one of the upper floors. The membership of the various bodies occupying this building probably totals over 50,000, and, excepting during two months in the summer, the building is fully occupied every night.

Another temple more recent than the New York and Brooklyn buildings, which typifies the ideal Masonic Temple, is the one just finished in San Francisco, designed by Messrs. Bliss & Faville. The Temple in Washington, designed by Messrs. Wood, Donn & Deming, is another dignified example of this type of building.

Many others equally interesting might be mentioned, but it must also be admitted that very many others might also be illustrated to show the lack of study and consideration which in so many cases has been given to this interesting type of building.

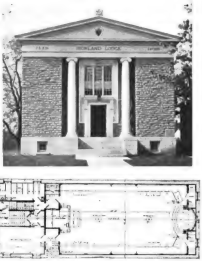
NOTE. — The author mentions several Masonic Temples which, because of their previous publication, have not been included among the illustrations in this paper. For the convenience of those who wish to study these buildings, references to the periodicals in which they and other secret order buildings of merit have been published are given herewith. The following, not otherwise marked, appeared in THE BRICKBVILDER in the months named:

Masonic Temple, Brooklyn, N. Y., Lord & Hewlett and Pell & Corbett, Associated Architects, July, 1909; Masonic Temple, Washington, D. C., Wood, Donn & Deming, Architects, July, 1909; Masonic Temple, Camden, N. J., Heacock & Hokanson, Architects, September, 1913; Masonic Temple, Memphis, Tenn., Jones & Furbringer, Architects, September, 1914; Elks Club House, Philadelphia, Pa., Simon & Bassett, Architects, July, 1906; Elks Club House, Brooklyn, N. Y., H. Van Buren Magonigle and A. W. Ross, Architects, March, 1915; Temple of the Scottish Rite, Washington, D. C., John Russell Pope, Architect, *The Architectural Review*, January, 1916; Masonic Temple, San Francisco, Cal., Bliss & Faville, Architects, *Architecture*, March, 1914. — EDITORS.


Masonic Temple, Indianapolis, Ind.
Rubush & Hunter, Architects

First Floor Plan

I. O. O. F. Temple, Hamburg, N. Y.
Lansing, Bley & Lyman, Architects



First Floor Plan

Masonic Temple, Buffalo, N. Y.
Green & Wicks, Architects

GENERAL VIEW OF EXTERIOR

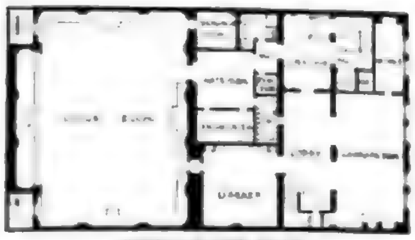
FIRST FLOOR PLAN

SECOND FLOOR PLAN

MASONIC TEMPLE, EAST WEYMOUTH, MASS.
ARTHUR H. VINAL AND J. SUMNER FOWLER, ARCHITECTS

Group of Lodge Buildings of Representative Fraternal Societies and Secret Orders

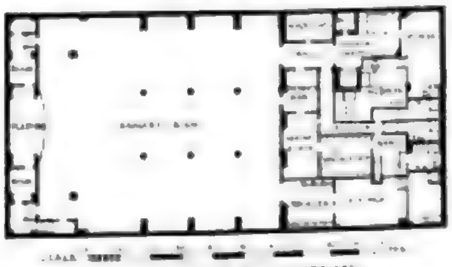
GENERAL VIEW OF EXTERIOR



THIRD FLOOR PLAN

SECOND FLOOR PLAN

FIRST FLOOR PLAN



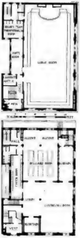
BASEMENT FLOOR PLAN

AUDITORIUM

LODGE ROOM

KNIGHTS OF COLUMBUS BUILDING, SAN FRANCISCO, CAL.
SMITH O'BRIEN, ARCHITECT

GENERAL VIEW OF EXTERIOR



FLOOR PLANS

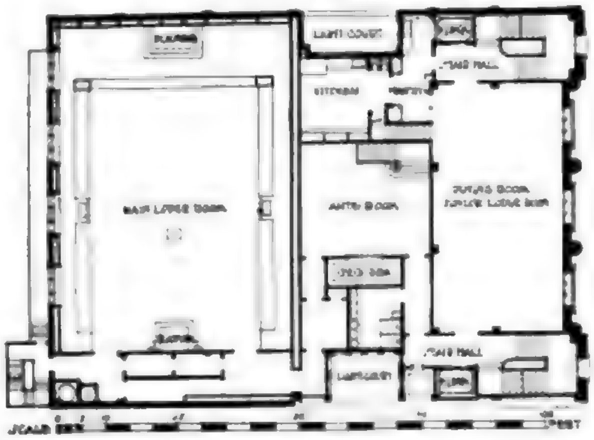
EAGLES CLUB HOUSE, BUFFALO, N. Y.
ESENWEIN & JOHNSON, ARCHITECTS

FIRST FLOOR PLAN

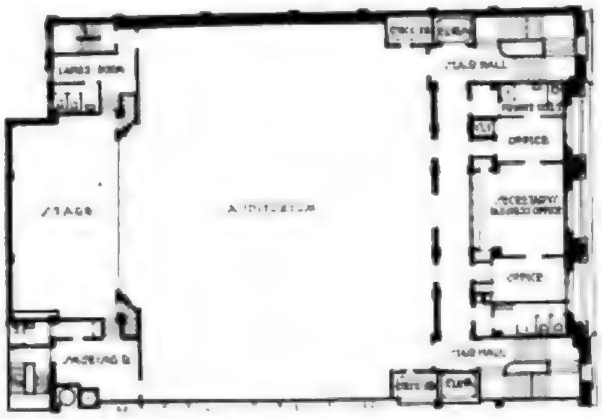
BASEMENT PLAN

GENERAL VIEW OF EXTERIOR

KNIGHTS OF COLUMBUS BUILDING, COLUMBUS, OHIO
FRANK GLEICHAUF, ARCHITECT

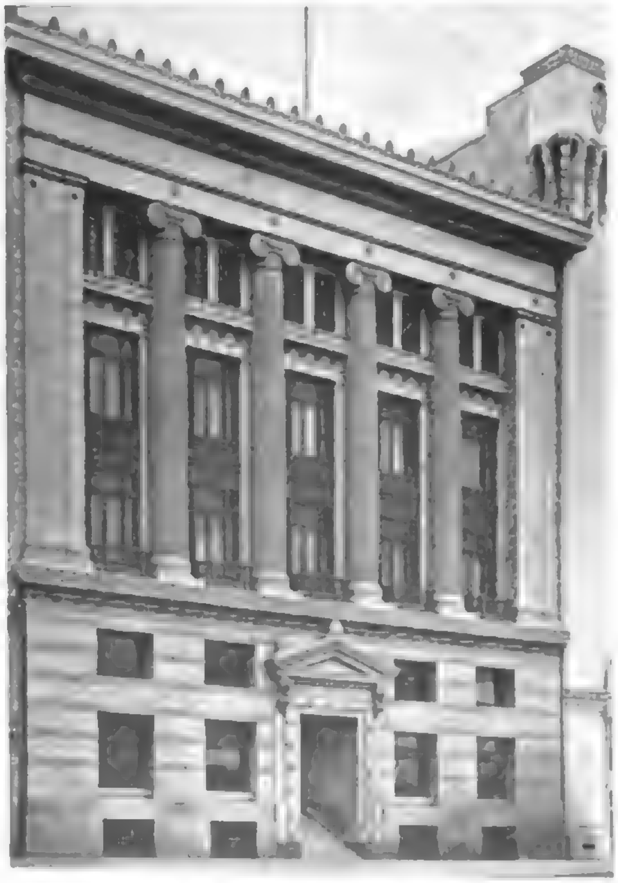


FOURTH FLOOR PLAN



SECOND FLOOR PLAN

TEMPLE OF THE LOYAL ORDER OF MOOSE
PITTSBURGH, PA.
U. J. L. PEOPLES, ARCHITECT

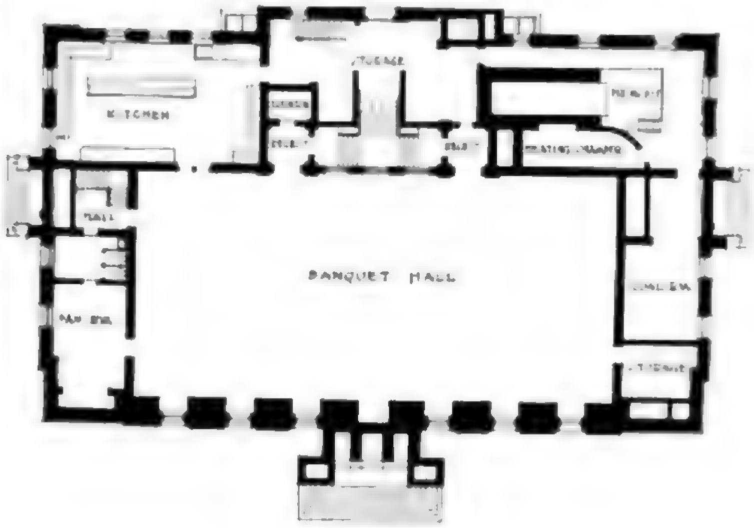


THIRD FLOOR PLAN

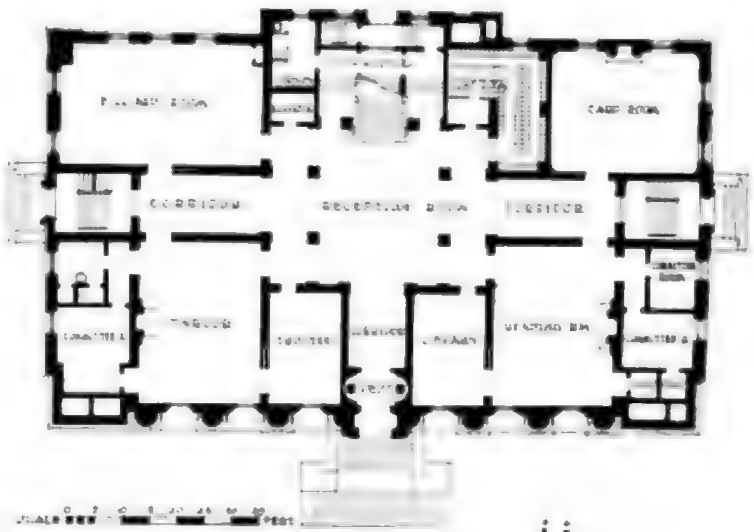
FIRST FLOOR PLAN

YOUNG MEN'S INSTITUTE AND DONAHUE LIBRARY, SAN FRANCISCO, CAL.
W. D. SHEA, ARCHITECT

GENERAL VIEW OF EXTERIOR



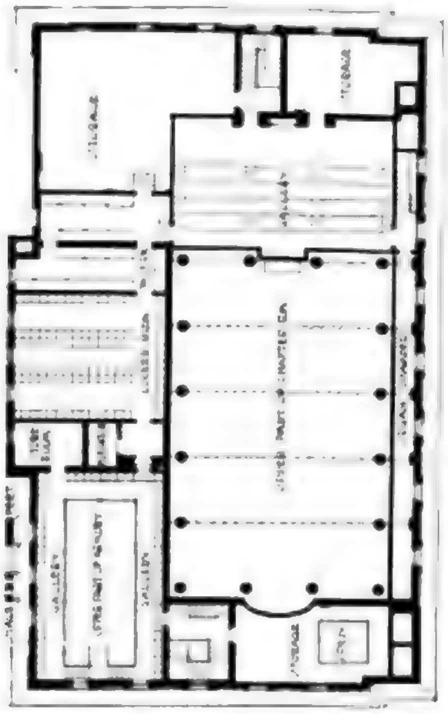
BASEMENT FLOOR PLAN



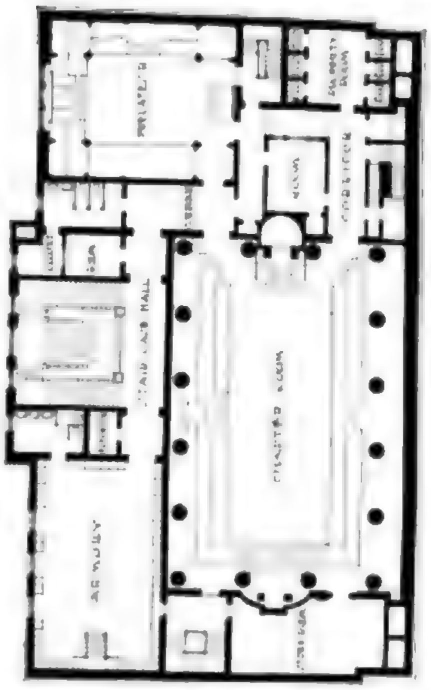
FIRST FLOOR PLAN

MASONIC TEMPLE, WORCESTER, MASS.

GEORGE C. HALCOTT, ARCHITECT



THIRD FLOOR MEZZANINE PLAN



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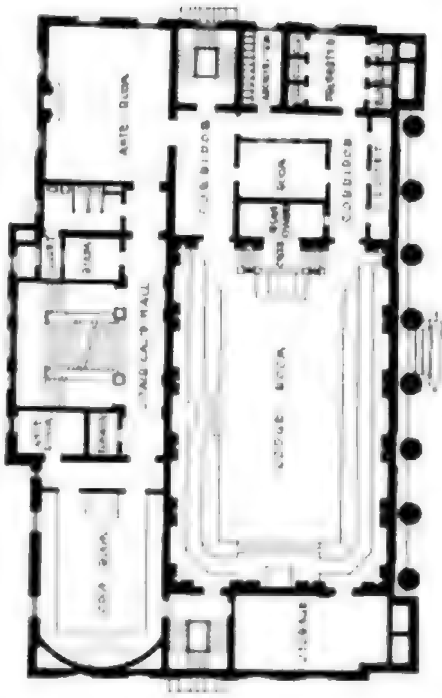
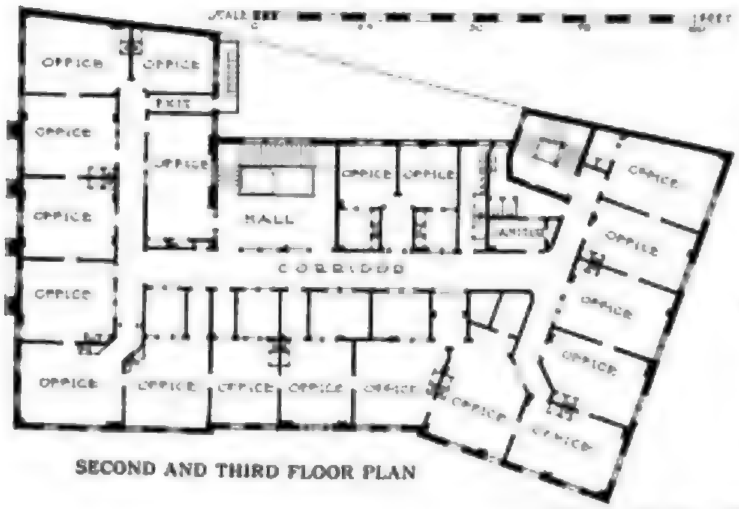


SECOND FLOOR PLAN

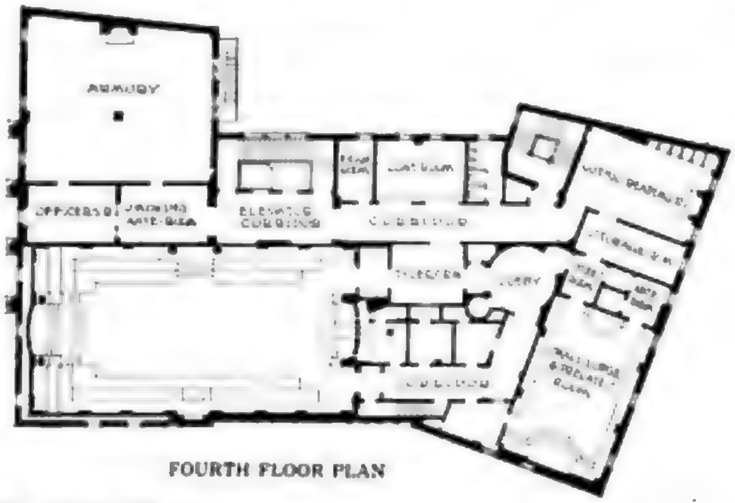
DETAIL OF MAIN FACADE

MASONIC TEMPLE, WORCESTER, MASS.
GEORGE C. HALCOTT, ARCHITECT

GENERAL VIEW OF EXTERIOR



SECOND AND THIRD FLOOR PLAN

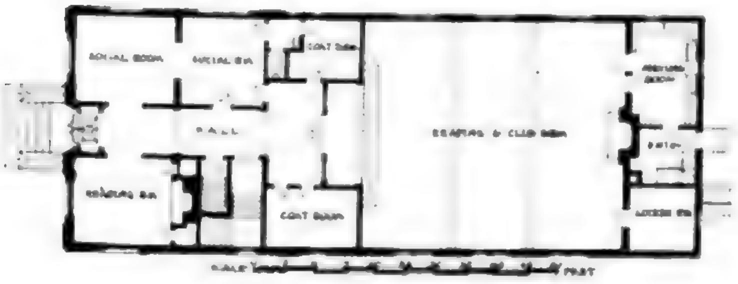


FOURTH FLOOR PLAN

MASONIC TEMPLE, SALEM, MASS.

L. S. COUCH, ARCHITECT
LITTLE & BROWNE, ASSOCIATE ARCHITECTS

GENERAL VIEW OF EXTERIOR



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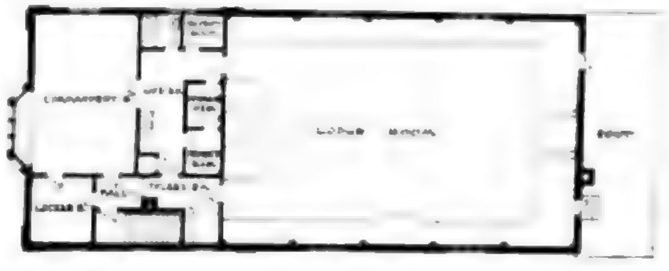
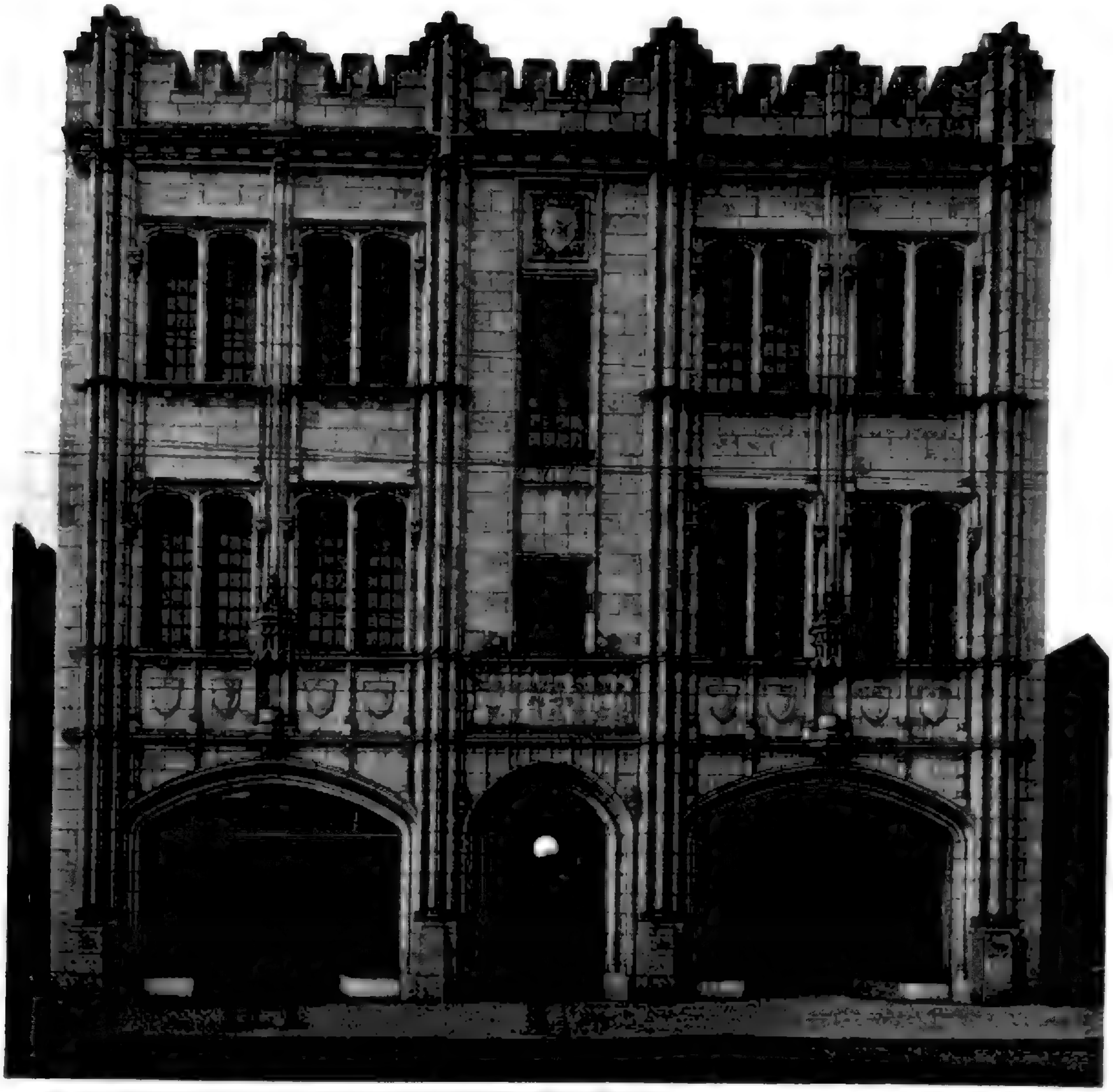


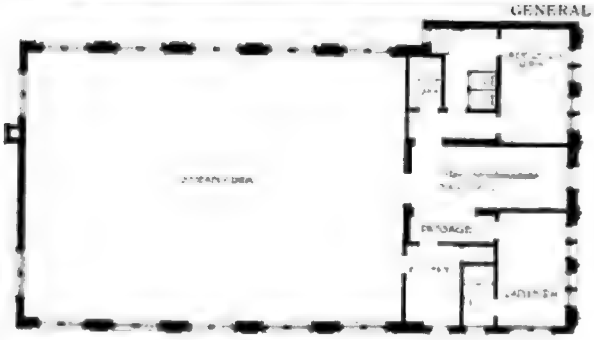
SECOND FLOOR PLAN

MASONIC TEMPLE, BENNINGTON, VT.

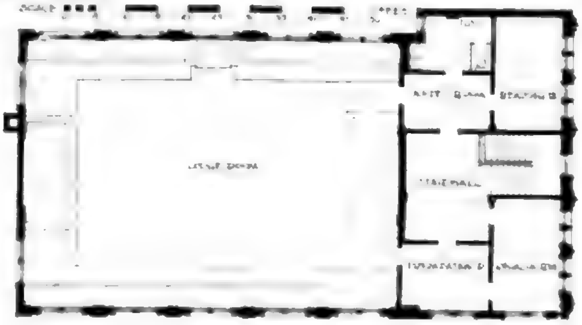
HARDING & SEAVER, ARCHITECTS



GENERAL VIEW OF FACADE



SECOND FLOOR PLAN

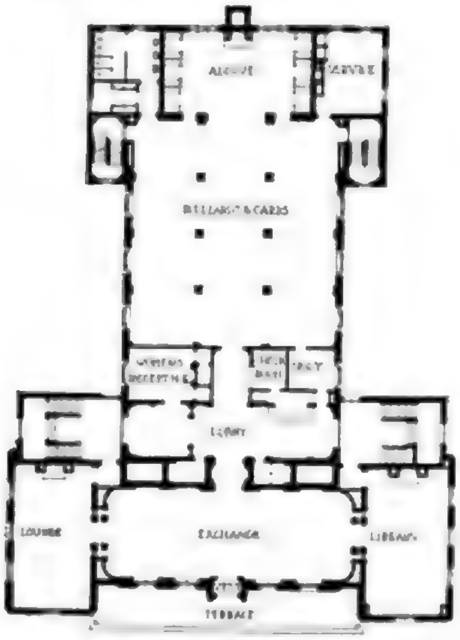


THIRD FLOOR PLAN

W. D. LUCKIE LODGE MASONIC BUILDING, ATLANTA, GA.

HENTZ, REID & ADLER, ARCHITECTS

GENERAL VIEW OF EXTERIOR



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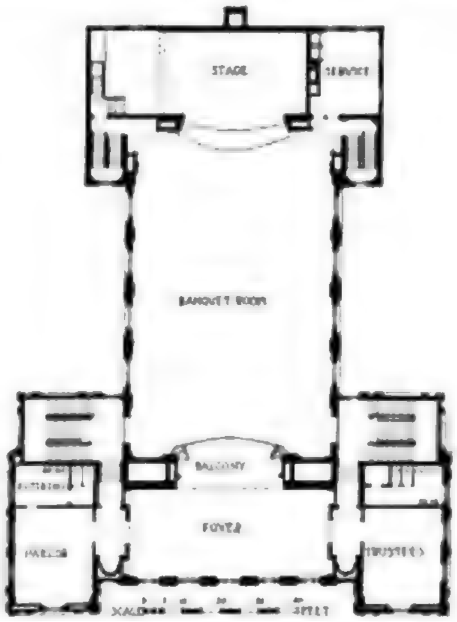

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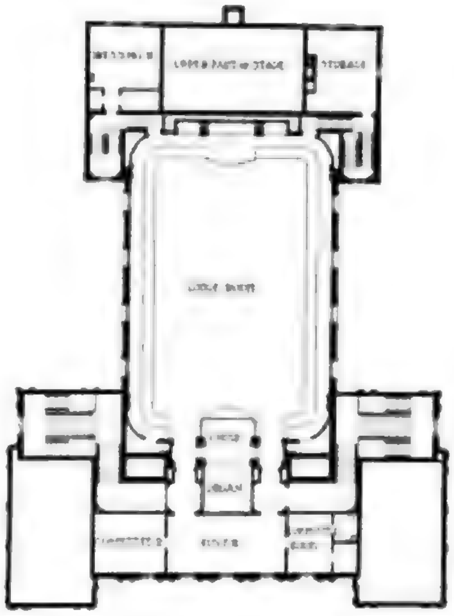


THIRD FLOOR PLAN

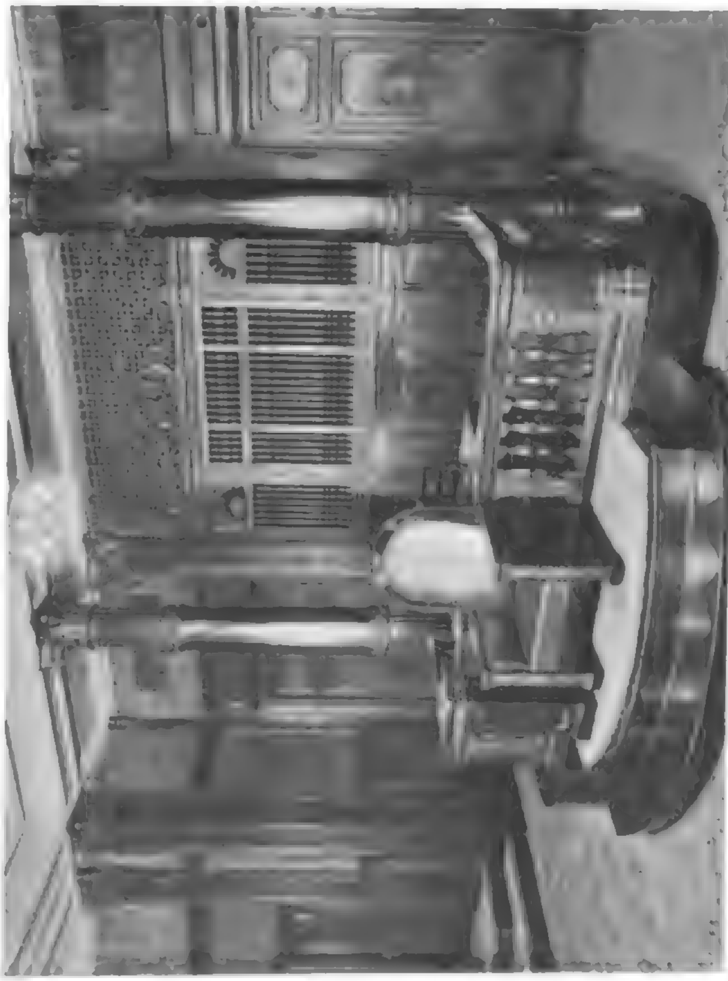
ELKS CLUB HOUSE, COLUMBUS, OHIO

FRANK L. PACKARD, RALPH SNYDER, GEORGE R. BASSETT, AND EDWARD F. BABBITT, ARCHITECTS AND ENGINEERS, ASSOCIATED

RECEPTION FOYER

FIRST FLOOR EXCHANGE

RATHSKELLAR

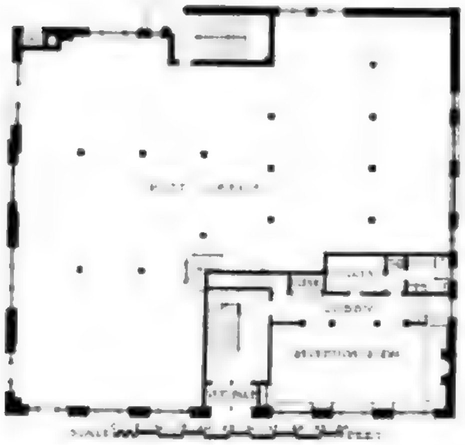


NORTH END OF LODGE ROOM

ELKS CLUB HOUSE, COLUMBUS, OHIO

FRANK L. PACKARD, RALPH SNYDER, GEORGE R. BASSETT, AND EDWARD F. BABBITT
ARCHITECTS AND ENGINEERS, ASSOCIATED

GENERAL VIEW OF EXTERIOR



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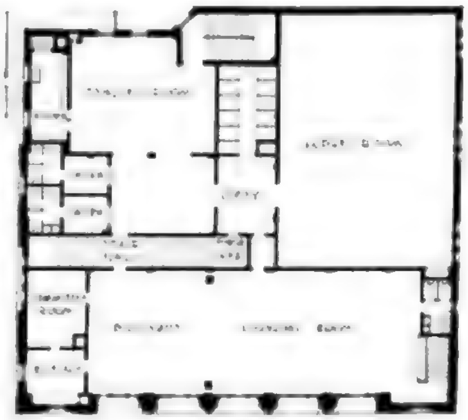

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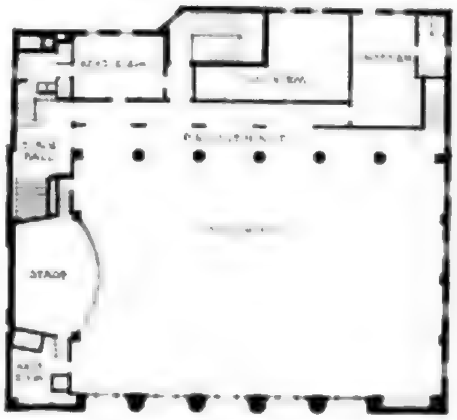
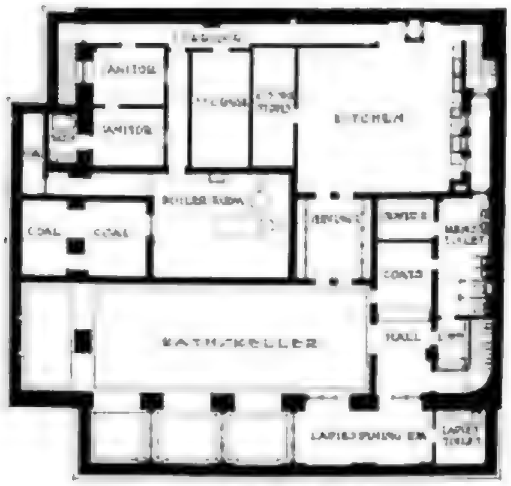


THIRD FLOOR PLAN

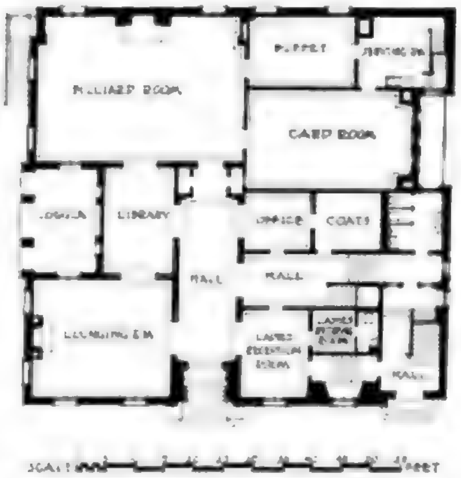
ELKS CLUB HOUSE, CAMBRIDGE, MASS.

CHARLES R. GRECO, ARCHITECT

GENERAL VIEW OF EXTERIOR



BASEMENT FLOOR PLAN



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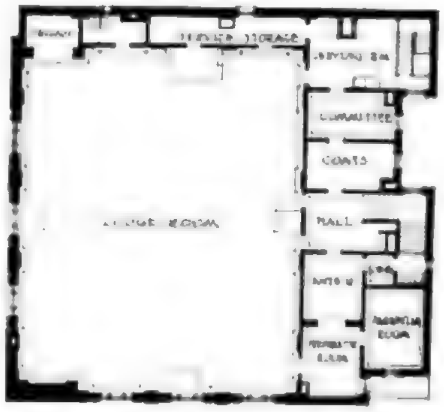
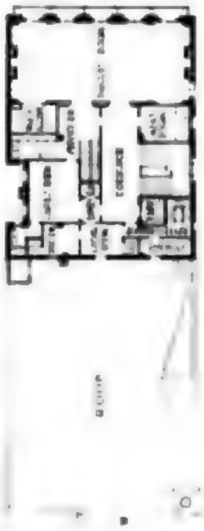


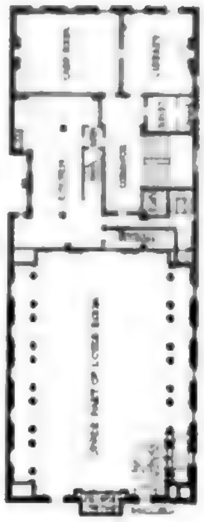
SECOND FLOOR PLAN

ELKS CLUB HOUSE, MANKATO, MINN.
TYRIE & CHAPMAN, ARCHITECTS

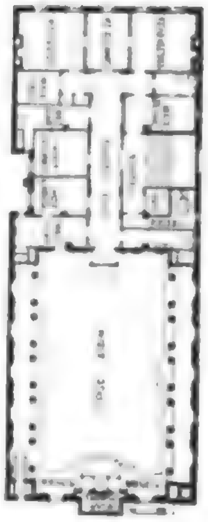
DETAIL OF UPPER STORIES



FIFTH FLOOR PLAN



FOURTH FLOOR PLAN



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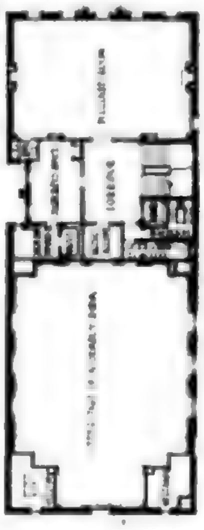

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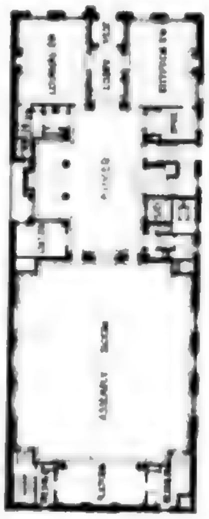

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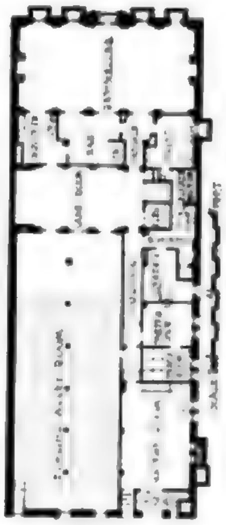
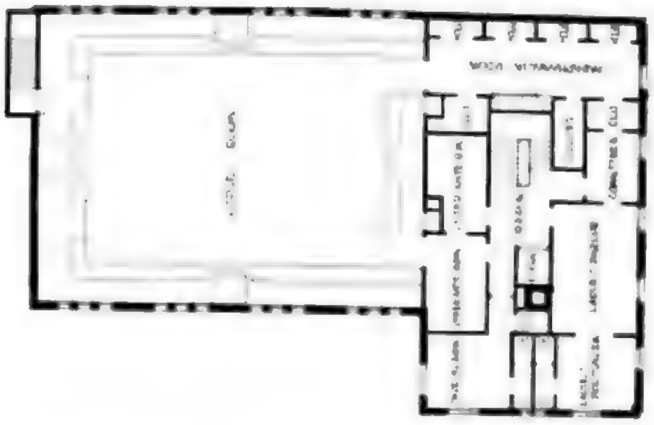


BASEMENT FLOOR PLAN

GENERAL VIEW OF EXTERIOR

ELKS CLUB HOUSE, BALTIMORE, MD.

WYATT & NOLTING, ARCHITECTS



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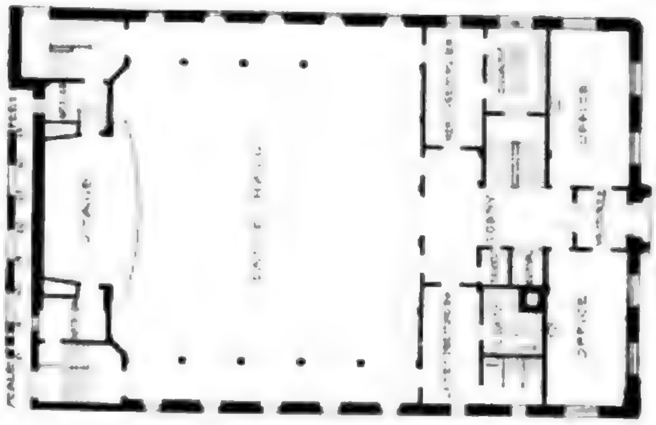

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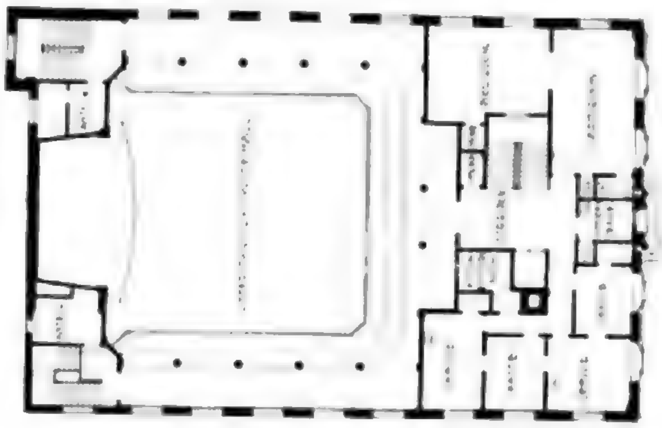

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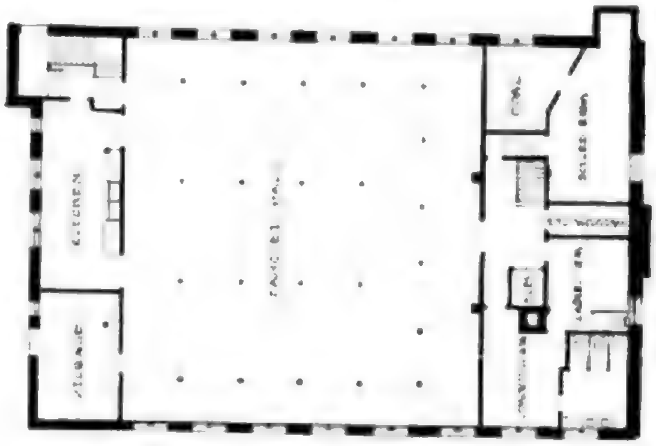


BASEMENT FLOOR PLAN

GENERAL VIEW OF EXTERIOR

PYTHIAN TEMPLE, BROCKTON, MASS.

JAMES H. RITCHIE, ARCHITECT

GENERAL VIEW OF EXTERIOR

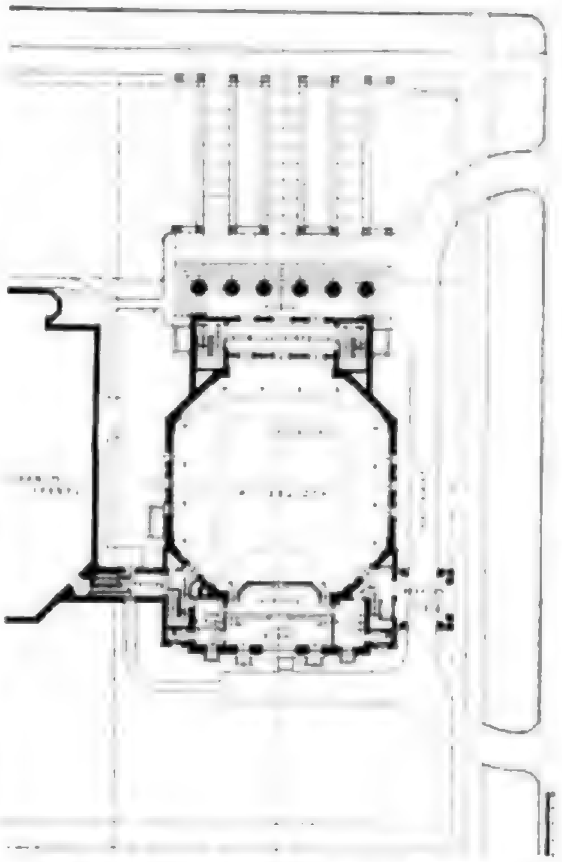
INTERIOR LOOKING TOWARD CHANCEL

CHAPEL OF MASONIC HOME, UTICA, N. Y.

H. P. KNOWLES, ARCHITECT

FIRST CONGREGATIONAL CHURCH, TOLEDO, OHIO
MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS

VIEW OF REAR



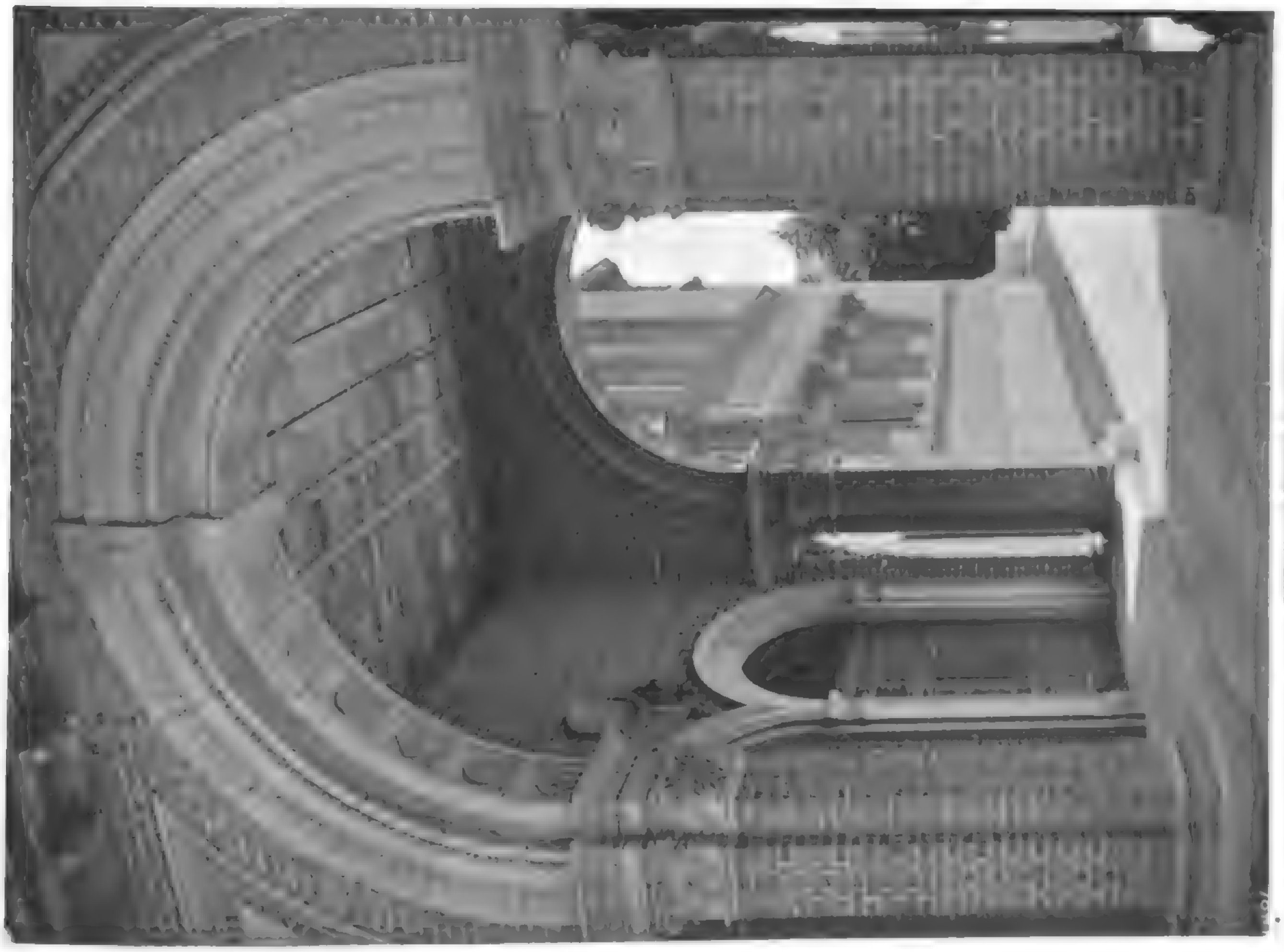
FIRST FLOOR PLAN

DETAIL OF ENTRANCE PORTICO

FIRST CONGREGATIONAL CHURCH, TOLEDO, OHIO

MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS

DETAIL OF SIDE ELEVATION



DETAIL OF PORTE COCHERE

FIRST CONGREGATIONAL CHURCH, TOLEDO, OHIO

MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS

INTERIOR VIEW LOOKING FROM CHANCEL

DETAIL VIEW OF CHANCEL

FIRST CONGREGATIONAL CHURCH, TOLEDO, OHIO

MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS

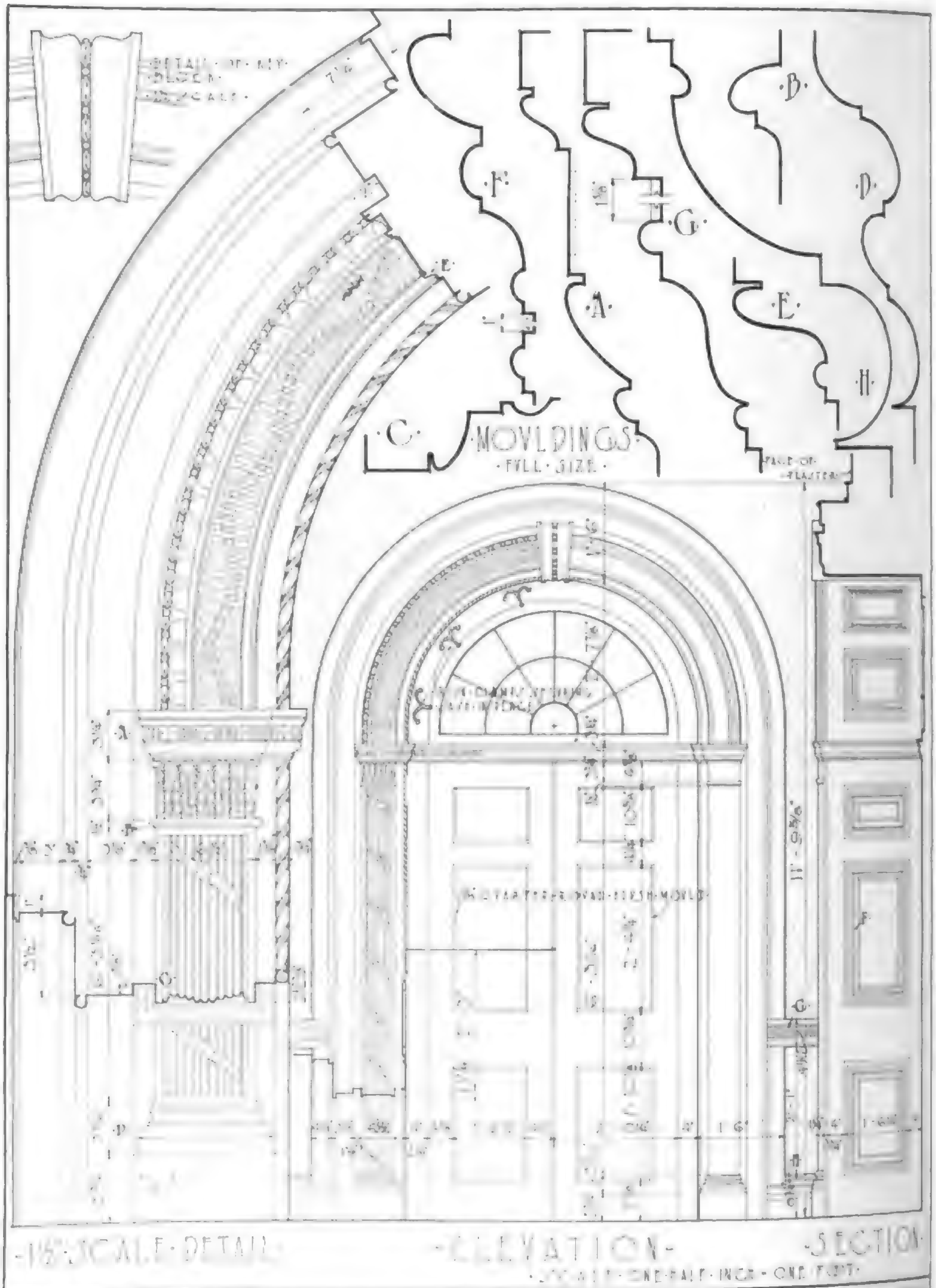
THE BRICKBVILDER COLLECTION OF

EARLY AMERICAN ARCHITECTURAL DETAILS

PLATE THIRTY-FOUR

INTERIOR OF ENTRANCE DOORWAY, BRADDOCK HOUSE, ALEXANDRIA, VA.

MEASURED DRAWING ON FOLLOWING PAGE



·PLATE 34·	·INTERIOR·DOORWAY ~ BRADDOCK·HOVSE· ALEXANDRIA·VA·	·MEASVRED & DRAWN BY·
DECEMBER 1916	·BVILT·BY·JOHN·CARLISLE·	·J·L·REISTER· MVNSON & JENKINS

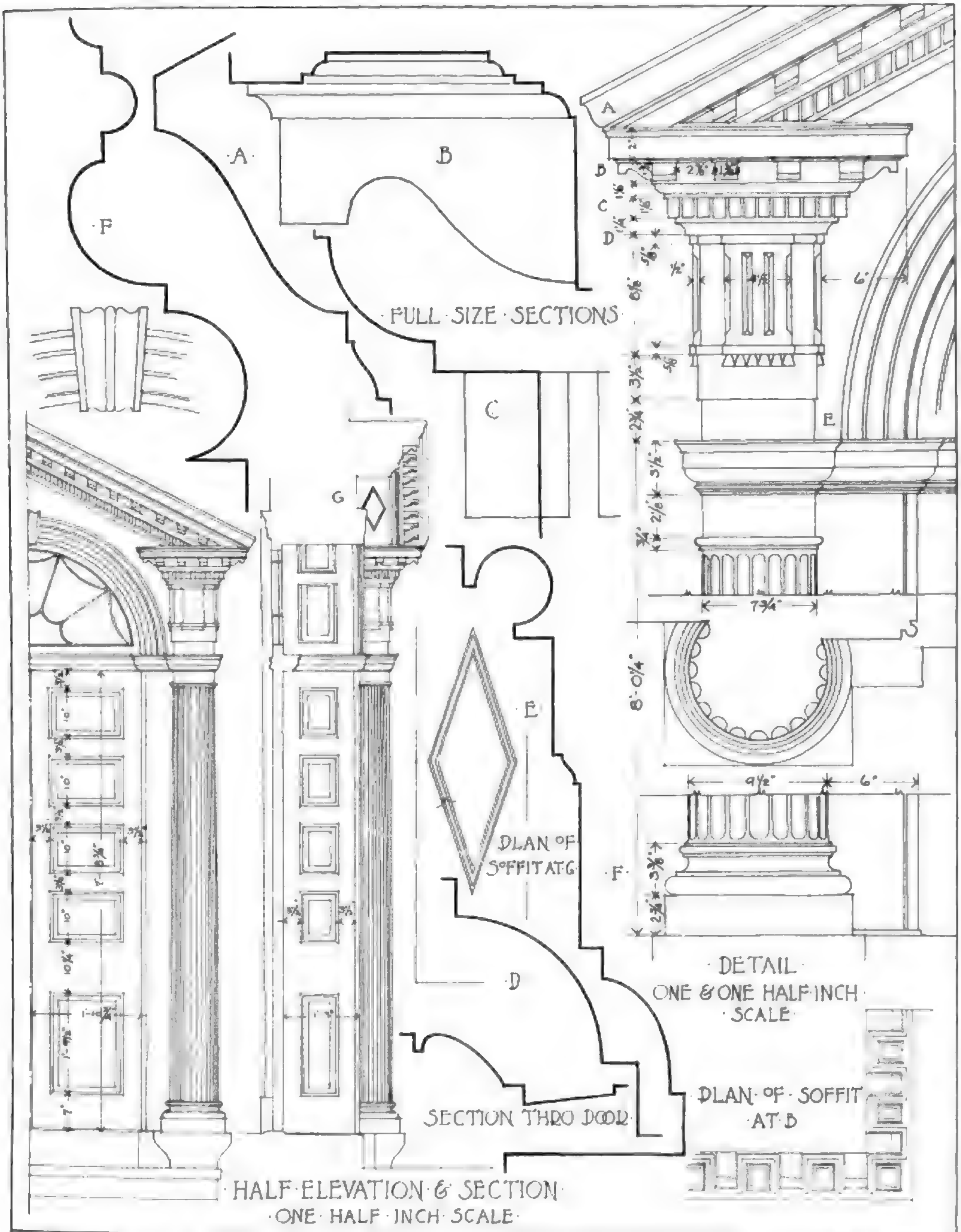


PLATE 35 DECEMBER 1916	· DOORWAY · LLOYD · HOUSE · · BUILT · 1796 · · ALEXANDRIA · VA ·	MEASURED & DRAWN BY RIGGIN BUCKLER

PLATE THIRTY-FIVE

ON Washington street, just around the corner from Christ Church in Alexandria, the Lloyd House is located. It was built according to the date on the leader head in 1796. The doorway is one of the best of the early examples in Alexandria. The detail is strictly classic, with none of the delicately carved members found on other work in this interesting old town.

A curious feature is the peculiar cutting of the stone plinths under the columns, reducing the width of the platform and giving the doorway a top-heavy appearance.

The interior of the house was unfortunately renovated in ante-bellum days and now contains little of interest in its architectural finish.

DOORWAY OF THE LLOYD HOUSE, ALEXANDRIA, VA.
Built in 1796

MEASURED DRAWING ON PRECEDING PAGE

Co-Partnership Housing in England

By ROBERT RANDAL

THE co-partnership movement in housing may be said to have received its first suggestion from a Frenchman. Godin, writing in 1880, outlined a scheme of "logements" from which all character of speculation should be eliminated. "It would be well," he says, "to organize it in such a way that the return on capital should be limited to a maximum of 4 or 5 per cent for example, and that the profits of this yielded by the apartments should be shared among the tenants in proportion to the amount of rents paid. This sharing of the rental revenue is calculated to attach the population to the success of the enterprise and to encourage them in sound economics." And it might be added, to solve the question of who shall inherit the unearned increment.

Here, then, briefly stated, are the fundamental principles of co-partnership as applied to the housing problem; and the difference from the other various methods by which workmen could gradually acquire their own houses is at once apparent. The property, instead of falling into individuals' hands, becomes a sort of trust in which all are concerned, and it is interesting to note that several of the English garden suburbs which are in no way based upon co-partnership principles were started with the object of enabling the workman to acquire the complete ownership of his house and land. It was realized, however, that insidious speculation would soon creep in; that the advantageous circumstances under which the houses were being built would tempt unscrupulous tenants to sublet at enhanced rentals, and that the objects with which the philanthropist founded the estate could thus easily be perverted.

But a co-partnership scheme goes farther than a philanthropic village trust, as it seeks to provide better conditions of living on the inhabitants' own initiative, and to treat external financial support as a purely business proposition to be remunerated at a reasonable and safe percentage. An attempt has been made to distinguish between a co-operative and a co-partnership housing society. The former is the more democratic organization in which the majority of the committee of management are tenant-shareholders, and in which the elections for the committee of management are in the hands of all tenants. On this basis have been devised many of the small independent estates, and it is a system well suited to mining areas where good wages are earned and outside financial help can be partly dispensed with. Co-partnership societies are taken to mean those in which a large proportion of the capital is subscribed by non-tenants, and as a result the representation of tenants upon the management committee is small; it is also to be expected that such an arrangement tends toward the establishment of a central organization with affiliated or offshoot estates.

The first society to be started in England was the Tenant Co-operators, Ltd., due to the energy of Mr. Benjamin Jones, manager of the London Branch of the Co-operative Wholesale Society. It was probably his object to make this new co-operative undertaking work in close relationship with the Wholesale Co-operative Societies, which at the time were reputed to possess about ten millions sterling of accumulated funds and to be in uncertainty as to how to dispose of them satisfactorily. Unfortunately in spite of Mr. Benjamin Jones' important position in the co-operative world, the wholesale societies do not appear to have realized that they owed anything to the working classes (*i.e.*, to themselves) beyond supplying them with cheap commodities, and were content to leave the supply of healthy and cheerful houses in the hands of speculative builders. Mr. Jones, so far as can be ascertained, received no support from them, and it would seem that it has required thirty years of education to make them see the power in improving their own conditions which they possess in these accumulated funds; their awakening may produce the biggest development in British housing that has yet been seen.

But there is, perhaps, another explanation of the failure of the Tenant Co-operators to appeal to the imagination of the older forms of co-operators, and also indeed of the general public. Their proposals related to housing and did not embrace the wider "town-planning" point of view. This is the more remarkable, seeing that the year of their incorporation, 1887, coincides with the founding of Port Sunlight, in which the necessity of *site-planning* in conjunction with *house-design* was laid down from the outset. The Tenant Co-operators contented themselves with the purchase of existing houses or the erection of separate terraces, in which none of the advantages accruing from a modern treatment of the site were possible. It may be urged that, without the support of the accumulated millions upon which they had relied, they were unable to launch out sufficiently to show the advantages of a departure from established methods of estate development, as Messrs. Lever Brothers were enabled to do at Port Sunlight. But this excuse will not quite cover the case, as it might have been possible to obtain an option upon a piece of land, and beginning in the most modest manner gradually to develop a community in which physical amenities were added to sound housing finance. As the Tenant Co-operators themselves confess, their "estates" did not possess the quality of "neighborliness"; "without a special meeting place, such as a men's and women's club, or some central institution, there has not been much opportunity for social gatherings beyond the ordinary half-yearly meetings. It cannot, therefore, be claimed that the spirit of co-operation is very strongly developed in the majority of tenants, or that altruism enters very largely into the mind of the average member of the society."

The next departure in the movement for co-operative housing was the establishment of the Co-partnership Tenants by Mr. Henry Vivian, and it is noteworthy that at the outset in 1902 the first estate at Ealing ignored the principles of site-planning and community grouping of buildings. But it was not long before its able director grasped the value of town-planning, owing to the object-lessons of Port Sunlight and Bournville, and possibly to the appearance of Ebenezer Howard's book on "The

Garden City" in 1898, though the major thesis of this work was outside the scope of these co-partnership estates. Nothing could testify more completely to the vitalizing effect of the modern town-planning movement than its result upon the Co-partnership Tenants, whose growth has been as rapid as that of the Tenant Co-operators has been stagnant.

The necessity for the treatment of the environment of the house as well as the house itself was recognized about the same time by two other organizations who both added the word "Town-planning" to their original names, "The National Housing Reform Council" and the "Garden Cities Association." It is an instructive lesson in the value of town-planning, as the complement of housing to visit the Ealing Tenants' estate and to compare their first efforts, where about one hundred houses face upon the ordinary "by-law"-governed roads, with the later work where the whole estate has been carefully laid out with a broad tree-lined avenue as its central feature, with sites provided for public buildings, open spaces formed, and existing trees preserved: where, in a word, the houses are grouped together so as to form a social organization, as well as a financial society.

At the same time it must be recognized that the Co-partnership Tenants' is a less democratic organization than the Tenant Co-operators' and has owed much of its success to the forceful domination of a single strong personality. Ostensibly, however, the financial organization of both are identical, for so successfully did Mr. Benjamin Jones and his colleagues draft their rules that the new society took them over *en bloc*, with the ready consent of their originators. Quite small modifications in the application of the same principles are sufficient to produce divergent results, and one such may here be noted: the Tenant Co-operators issued £1 shares, and a tenant need not take up more than one share; the Co-partnership Tenants issue usually £10 shares, and a tenant must ultimately take up five shares.

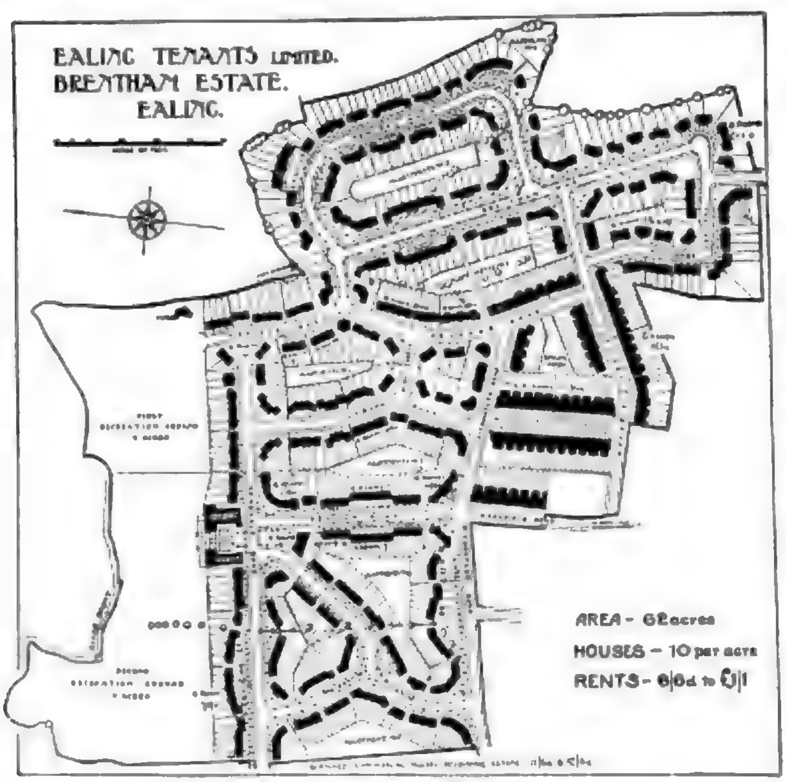
One of the principal features which has worked well, but which shows signs of having reached the limits of its success, is the arrangement of the co-partnership activities into a threefold interdependent group:

1. The Co-partnership Tenants Housing Council.
2. The Co-partnership Tenants', Limited.
3. The Federated or Affiliated Societies.

The first is a purely propagandist body and exists for the purpose of rousing public interest in the method of working, collecting, and tabulating statistics as to health and other matters upon co-partnership estates, and giving advice to groups of people in different parts of the country as to the best ways of starting a society; it also conducts a magazine called *Co-partnership*. The second is a business company registered under the Industrial and Provident Societies Act (1893) and is classed as a Public Utility Society, according to the definition in the Housing and Town Planning Act, "the rules whereof prohibit the payment of any interest or dividend at a rate exceeding £5 per centum per annum." Among the various usefulnesses of such a central financial body may be mentioned:

1. To provide expert advice, based upon accumulated experience of how to buy, lay out, and develop an estate.
2. To raise capital for such societies as join the Federation and accept its advice.
3. To pool, where practicable, all orders, so that the benefits of wholesale dealing in building materials shall be secured to the federated societies.
4. To organize and equip central workshops where standardized features may be manufactured in order to be able to compete with the speculative builder who buys his doors, windows, etc., ready made.
5. To maintain an architectural staff which is able, if required, to provide designs for the houses on the federated estates; they are not tied to them, but the staff frequently acts in a consulting capacity to local architects, giving them the benefit of wide experiences of similar work elsewhere.

The society in 1915 had a capital of £338,801, consisting of £10 shares carrying an interest of 5 per cent and loan stock at 4 per cent; and some idea of its financial value to the various societies in membership may be gathered from the fact that since 1907 (when it was registered) £1,060,672 has been raised for them by the parent body in shares, loan stock, bonds, and on mortgage. There are at present fifteen federated societies whose estates cover



Plot Plan of Co-partnership Estate at Ealing

804 acres and whose cost value as to land and buildings at the end of 1915 was estimated to be £1,603,904. When built up they will contain about 9,000 houses, at the rate of not more than twelve to the acre, and there will be about ninety-one acres of open spaces.

From these few facts may be gathered something of the nature of the general character of the undertakings. Turning to the detailed financial arrangements of each society, we find that the members consist of the ordinary shareholders and may be either tenants or not: if a tenant, he is required to take up shares to the value of £50* which he may do at once or acquire by instalments. Both those who pay the £50 down and those who avail themselves of the instalment method receive 5 per cent per annum interest on the amount paid up. In the latter case, instead of being handed over in cash, it is the practice to credit the interest to the tenant shareholder until his holding (including both cash payments and interest) has reached the minimum of £50, after which he can withdraw his annual interest in cash. The non-tenant investor must take up a minimum of £20, and in order that no member, whether resident or not, may obtain a dominating interest, all individual holdings are limited to £200. The Committee or Board by which the society is managed is annually elected by these shareholders.

The financial problem, as of course is the case with all building societies, is that the greater portion of contemplated expenditure falls into the first few years and actually takes place before any return from rents is possible. The amounts subscribed by intending tenants are manifestly inadequate to provide the necessary capital to make a start. It is therefore necessary to raise money by other means and one of the most important is by the issue of loan stock upon which no limit as to holding is placed. It is interesting to note that in the Hampstead Tenants, whereas the loan stock at the close of the first year (1907) was nearly double the share capital, in two years' time the proportion was

£19,950 shares,
£24,150 loan stock.

The following is a tabulated list of the methods by which the societies raise the necessary funds for their work:

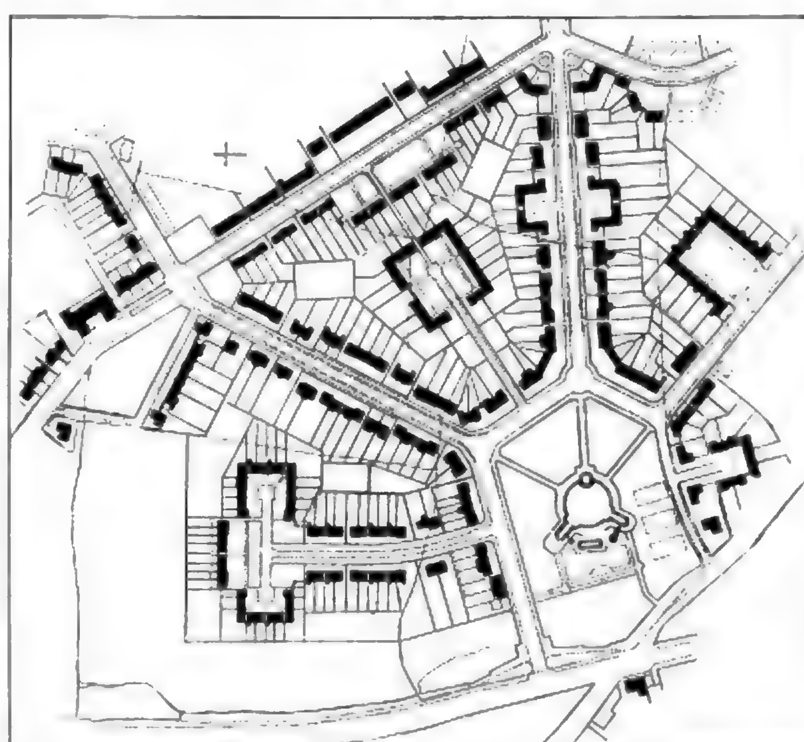
1. Share capital, subscribed as mentioned above, both by tenants and non-tenants, limited to individual holdings of £200, and carrying a maximum interest of 5 per cent, dividends not being paid until all other claims are met.

2. Loan stock, subscribed either by members or outsiders, not limited in amount, and carrying an interest of not less than 4 per cent and not more than 5 per cent and redeemable at par. It is in this loan stock that the great co-operative societies might profitably invest their surplus capital, and it offers to individuals a safe investment with moderate return secured upon the land and buildings, with the additional attraction that the investor feels he is actively helping on a good work. Mr. John Burns, late president of the Local Government Board, once called such investors, somewhat equivocally, 4 per cent philanthropists.

3. Loans on mortgage borrowed from the Public Works Loans Commissioners. Public Utility Societies registered under the Industrial and Provident Societies Act, 1893, are able thus to borrow on the security of the land and buildings up to two-thirds of the value of their property, and, before the war, loans were obtainable for periods up to thirty years at $3\frac{1}{2}$ per cent and up to forty years at $3\frac{3}{4}$ per cent. It is to be noted that such loans are only advanced for the erection of dwellings for the "working classes," and the following definition of them was recently put forward by the Commissioners:

> "Mechanics, artisans, miners, and skilled or unskilled workmen or laborers, working for wages; hawkers, costermongers, and persons not working for wages, but working at some trade or handicraft without employing others except members of their own family, and persons, other than domestic servants, whose incomes from all sources do not exceed the sum of two pounds a week, and the families of any such persons who may be residing with them."

This is a singular and unsatisfactory definition, as it eliminates shop assistants, clerks, junior draftsmen, and others, who may be earning slightly more than £2 a



Portion of Plan of Co-partnership Estate at Hampstead

*These figures are actually taken from the Hampstead Tenants; they hold good with minor modifications for other societies.

week, but who, owing to the necessity of keeping up a more expensive degree of appearances, are just as much in need of help in their housing; the definition, on the other hand, includes mechanics, miners, riveters, etc., who can earn anything from £5 to £6 per week.

4. Loans on mortgage at short call. One of the drawbacks of borrowing from the Public Works Local Commissioners is that money is not advanced until the buildings are in existence. It is, therefore, necessary to negotiate loans at short call through banks, individuals, or lending agencies.

It is not necessary to labor the point how essential it is for co-operative housing societies to be able to raise sums of money outside those obtained from shares and loan stock; even one-third is a formidable amount for a society to raise, particularly if it is desired to keep the management as much as possible under the control of the tenants and not to be beholden to the outside investor. It is, therefore, interesting to note that in the Emergency Housing (No. 2) Act, 1914, which was introduced with the object of relieving possible unemployment in the building trades, a new policy was laid down. This act has never been made use of, for the simple reason that military service has counteracted unemployment; but there is reason to believe that its principles having once passed through Parliament may be later incorporated into legislation. This act empowered the local government board to make free grants of money to public utility societies for housing purposes to an amount not exceeding 10 per cent of the capital expenditure and to advance loans to 80 per cent of the value of the property, to be repaid on the annuity system in sixty years at 5 per cent. This leaves only 10 per cent instead of one-third of the capital to be found at the outset — a difference which would enormously increase the activities of co-operative societies. Another great help would be afforded by the state if advances could be made upon the buildings in course of erection. This would solve the issuing of short loans and simplify the financial arrangements.

Though it is usually the practice to begin paying interest upon the loan stock as soon as it is paid up, the estate does not, of course, produce any income until a certain number of houses are let. This income is then applied in the following order:

1. Interest upon loans, both government and "on short call." The government loan is also repaid by instalments, so that there is a continually reducing figure under this head.

2. Interest on loan stock, together, if thought desirable, with a sinking fund for the redeeming of the stock.

3. Repairs, upkeep, and administration of the estate; in the latter may be included the provision of buildings for social and educational purposes.

4. Interest upon the share capital subscribed by tenants and non-tenants.

5. Surplus profits. After the above have been paid, these are credited to the tenants on the amount of rent that they pay. These dividends upon the rent are not usually paid up in cash, but are added to the tenant's capital.

It is this last division of the profits which constitutes the chief advance of these methods of housing over those formerly practised. After paying all normal charges and allowing for social obligations, the unearned increment accrues to the tenant owner instead of to the landlord. Continued residence will mean an increased value to his holding, for as the years pass and the society's borrowed capital is gradually repaid, the time will approach when the estate will become the property of the tenant-shareholders. Besides this he can invest his savings with an interest of 5 per cent, and by the time that his holding in the society equals the value of the house and land, the interest which he receives will approximately equalize the rent he pays. This is a perfectly safe and singularly easy way of gradually acquiring the value of a house, and to all intents and purposes he is the sole owner of the house, though as co-partner he is part owner of many. Mr. Nettlefold in his book, "Practical Housing," has summed up the position in the following neat manner: "No member can say, 'This house is mine.' They can all say, 'These houses are ours.'"

The tenant enjoys numerous advantages not possessed by one who either rents a house from a landlord or who buys it outright:

1. The tenant is not bound to a house if his work calls him elsewhere. On giving due notice, it will be taken over by the society which bears any loss in having a house on its hands.

2. The tenant on leaving the house can either keep his shares in the society and draw his 5 per cent interest wherever he is, or if he likes he can sell them, provided the society does not wish to exercise its powers to pay out the holder at par.

3. While he wishes to remain at one house he has full security of tenure and cannot be turned out unless he fails to fulfil his obligations or proves a nuisance to the community.

4. If the affairs of the society prosper, he has a chance of getting a bonus upon his rent.

5. He has the use of the society's open spaces, which are provided as part of the definite policy of the movement.

6. The houses being designed by architects and not speculative builders offer more variety in arrangement and are sounder in construction.

7. He has an opportunity of sharing in the social life of the community and in the management, and generally feeling the advantages of neighborliness.

8. He has the advantage of a garden, which in varying size is attached to all houses, and, if he wishes to cultivate more land, allotments are provided.

9. His property, or his share in the common property, is not likely to depreciate on account of bad neighbors. It is well known that where houses are owned outright a foul owner will contaminate a neighborhood, and even in rented property the dirty tenant is not always ejected before he has damaged the surrounding amenities — in a co-partnership estate such individual plague spots are impossible.

10. The tenant has the advantage of an estate laid out upon town-planning lines, with all the features of grouping of buildings, careful road plotting, and preservation of existing features. And as an estate plan is prepared in advance he can judge what will be the general effect when the society's land is fully developed. He does not

run the risk of finding some objectionable building springing up in close proximity to his house.

From the point of view of the society, as owner and financial agent, the arrangements are satisfactory; there can be no bad debts on account of rent, as arrears can always be deducted from the tenant's share capital. And the investor has a good security through the large number of buildings over which his holding is spread.

Repairs are managed in several ways: in some societies external repairs are a charge upon the revenue of the society, and internal repairs done by the society are charged against the profit account of the tenant of the repaired dwellings; this method encourages carefulness, as each tenant is anxious not to curtail his share of the profits. In other societies all internal repairs must be done at the tenant's direct expense. Another practice is to set aside a fixed annual sum for repairs and at intervals to balance this up; if a tenant has had less than the average amount expended upon his house, the balance is credited him in shares.

Such is a general outline of the working methods of co-operative building societies and some of the advantages which their members enjoy. It has been suggested earlier that the organization of the Co-partnership Tenants, Limited, and the affiliated societies has shown signs of strain; it is the old story of an empire and its colonies gradually growing up into bodies capable of self-government. It is perfectly clear that in the early stages of the movement a strong central body was essential, and during the first years of a new society this central body can, with advantage, have a preponderance in the committee of management. Otherwise, if the control be in the hands of local tenant-shareholders, it might be possible for a clique consisting of members with the minimum share holding of £10 to obtain control over large sums and expend them injudiciously. But, on the other hand, it is urged that if the central body obtains a large amount of the share capital for a society and in return dominates its management, a kind of vicious circle is set up; the local tenants having little say in their affairs, local interest is not awakened, and local capital not forthcoming. It would be a simple matter for the central body to appoint a management committee in the first instance and then gracefully to efface themselves as the local offspring grew up. But the over-solicitude of parents is proverbial, and the very strength of character at headquarters, which was so valuable at the commencement, is apt to imagine that things will go amiss if its vigilance is withdrawn.

The Manchester Tenants, a small society possessing eleven acres at Burnage, is one of the most interesting for the purposes of study, both because the estate was completed in 1913 and because, though one of the societies affiliated with the Co-partnership Tenants, it has secured for itself a large measure of self-control. At present it is occupied in paying off the mortgage, after which it will redeem its loan stock. It has already declared a dividend on rents, but as these were small it was decided by the members to allow them to accumulate for a repairs fund. So long as rents remain stationary there will not of course be any increment value; but if the rents of similar surrounding property go up, there will not be any reason why new tenants should not pay a slightly enhanced rental — this will at once produce more marked profits for division among the tenants. The number of houses on this estate is one hundred and thirty-six, the area of open spaces two acres, and the cost of land and buildings £56,313.

The power of a society to raise the rents for its members was contested in a lawsuit by a member of the Penge Tenants (one of the Societies of the Tenant Co-operators). Mr. Justice Wright gave judgment for the Tenant Co-operators, basing it upon the phrase of the rule, "The tenant shall be charged a fair and usual rent for his occupancy of same" (*i.e.*, a dwelling). "On the whole," he said, "I think the proper interpretation is that which is also the natural interpretation, namely, that the tenant should be charged what is a fair and usual rent, *for the time being*, for his occupancy of the house." This rule, he pointed out, could be altered or rescinded by a vote of not less than three-fourths of a special general meeting at which not less than half the members were present. It is not likely that societies will raise the rents without very general agreement on the part of the tenants, but in this case it was found necessary to do so owing to increased charges on the property, mainly due to rates.

There are many small co-operative estates in England which through not being affiliated to any central body are comparatively little known: they usually possess a similar organization to that described, and with the slight alterations indicated in the conditions upon which loans are granted by the state there seems no reason why the movement should not spread very widely in the future. A small society at Hereford is worth mentioning as it shows how local authorities can co-operate to assist co-partnership schemes with the heavy charges in the early stage of their existence. Here the corporation actually bought the estate of nine acres for which they paid £1,500 and, after constructing the roads, handed it over to the society to build the houses. They refund the corporation within a certain term of years and thus ultimately become possessed of the freehold.

There is no doubt a great future before this housing policy in Great Britain and there must be a great value in these groups with their highly conscious citizenship, which in time will be found forming closely knit communities over the country. As yet the movement cannot be said to have touched the very poor, although at Hereford a tenant paying a rent of 4s. 6d. per week need only hold two £1 shares, and with 5s. 6d. per week, three £1 shares. But to the hard-working artisan class they offer many attractions and are an enormous improvement upon the old-fashioned building clubs.

Description of Fraternal and Secret Order Buildings

Masonic Temple, Worcester, Mass. Plates 186, 187. In this temple the architect has developed a building which expresses the atmosphere and dignity of the Masonic Order without reverting to the archaic forms of decoration which have so long been thought necessary to mark properly the façades of secret order buildings. Only once does a symbol appear, and that over the entrance doorway. The building is three stories high with basement and two mezzanine floors, and rises to a height of 70 feet. The exterior is characterized by the employment of a large scaled Ionic order and a vigorous handling of brickwork in panels and rustications. The first floor is devoted entirely to social purposes with all the rooms grouped on well defined axes. On the second floor the main lodge room is decorated in the Grecian manner with heavy Ionic piers and a painted ceiling and mosaic tile floor. On this floor in the rear there is a smaller lodge room called "The Middle Chamber" for the accommodation of purely routine business sessions. On the third floor the Chapter Room, extending through two stories with a gallery at one end, is carried out in the Egyptian style with a colonnade encircling its four sides and supporting a heavy beamed ceiling. The furniture in this and the Grecian Chamber was specially designed to harmonize with the architectural treatment. The armory on this floor is well designed for its practical uses. It is 24 feet high and its walls are lined with individual lockers for the members of the Commandery. They rise in two tiers, the upper one served by a gallery which encircles the room. The drill hall for the Commandery, which is also used for a banquet hall, is in the basement. It is 88 feet long and 44 feet wide and accommodates 440 diners.

Masonic Temple, Bennington, Vt. Plate 189. A narrow lot and buildings at either side influenced the plan and architectural treatment of this lodge building. The exterior is of water struck brick with concrete stone trim. The interior construction is of timber and the cost was 12 cents per cubic foot. The lodge room on the second floor extends to the full height of the roof and is treated with open timber construction in the Gothic style with leaded glass windows.

Elks Club House, Columbus, Ohio. Plates 191, 192. This building is situated on a corner lot 75 feet from one street and 60 from the other. The open space is treated with paved walks and a broad terrace on three sides of the building. The building is three stories in height, constructed of red brick with stone trimmings. In style it is a modification of Georgian Renaissance architecture, which affords a dignified, reserved, and imposing façade and at the same time conveys a domestic and homelike atmosphere. The main floor is given over to social purposes. The central portion of the basement is devoted to the heating and ventilating system, and the rear to a large grill room with kitchen and accessory rooms. The main portion of the second floor is occupied by the large banquet hall, which is provided with a stage and service rooms at one end. At the opposite end, a few steps above the floor, a balcony leads to a large reception foyer running across the front of the building which, when occasion demands, may be used in conjunction with the banquet hall increasing its seating capacity. The assembly hall alone seats 800. Directly over the banquet room on the third floor is the lodge room, wainscoted in wood and finished with an ornamental plaster ceiling.

Elks Club House, Baltimore, Md. Plate 195. The building occupies a lot 59 by 155 feet, with narrow alleys to the east and south and with no light privileges to the west. These conditions governed the plan and required the placing of as many day rooms in the front of the building as possible, utilizing the rear part of the building for the larger rooms, chiefly used in the evening. The assembly room on the first floor extends through two stories, and the mezzanine floor in the front portion is occupied by the billiard room and offices. The lodge room on the third floor extends through two stories. It is designed with a colonnade at each side on a raised dais. The columns support a segmental, vaulted, strapwork ceiling. The walls are paneled in soft, dull, finished oak. The mezzanine floor in the front, above this room, contains the card room and library, as well as the kitchen serving the banquet room on the floor above. The building does not have a general restaurant service, the kitchen being used principally in connection with the banquet room and the roof garden. The building is heated by steam, the larger rooms with an indirect system and with mechanical ventilation. A complete system of mechanical refrigeration is installed throughout with boxes in the bar, kitchen, storerooms, and floor service pantries. The exterior is constructed of a light, rough brick with the base and top story carried out in buff Indiana limestone. The construction is fireproof, being of steel and terra cotta flat arches. The building contains 728 cubic feet and cost $200,000 exclusive of furnishings, or 27½ cents per cubic foot.

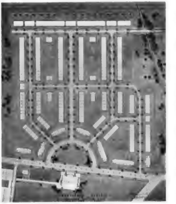
Knights of Columbus Building, San Francisco, Cal. Page 316. The exterior of this building is carried out in the Florentine style of architecture with sandstone of a greenish gray color, with a coat of arms in polychrome terra cotta. The soffit panels of the cornice are painted in colors to correspond with the coat of arms. The first floor contains an auditorium which, together with the gallery, seats 1,000 people. The second floor contains the large and small lodge rooms, as well as the club rooms for the order, and is reached through a separate entrance from the street. The main lodge is designed in the Doric style. The building is of fireproof construction on the first two floors and non-fireproof construction with metal lath on the upper floors. The total cost was $144,250 including architect's fees, or a cubic foot cost of 17 cents.

Club House Fraternal Order of Eagles, Buffalo, N. Y. Page 317. This building is located on a corner lot, 75 by 115 feet, one side of which is built up and the other with a 10-foot alley, allowing access to the rear entrance and court. The architecture follows the style of the Italian Renaissance and is executed in a light yellow gray brick and white terra cotta. The first floor is located 8 feet above the sidewalk level and contains the rooms devoted to the social or club side of the order. On the second floor is the lodge room of the order, 51 by 108 feet, with a gallery at one end.

An Industrial Village at Marcus Hook, Pa.

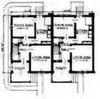
BALLINGER & PERROT, ARCHITECTS

THIS group of buildings, comprising the industrial village connected with the plant of The Viscose Company, is located at Marcus Hook, Pa., upon a tract of approximately twenty acres, situated upon the Philadelphia & Wilmington Post Road, the main highway between Chester, Pa., and Wilmington, Del. It consists at the present time of two hundred and fifteen dwellings, two boarding houses, a village store, and a dining hall and recreation building. The buildings are the property of the company, and the management of the estate is under its control. For this reason the consideration of the æsthetic in planning the village entered as much into the problem as the disposition of the rooms in the houses, so that instead of the usual industrial village, with rectangular plots and long rows of uninteresting houses, there are streets diverging from a central plaza with pleasant vistas and a diversified architectural treatment of the buildings.

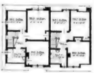

Plot Plan of Industrial Village

There are two classes of houses to accommodate the varying wages of the employees. Those surrounding the semicircular plaza have eight rooms and are occupied by the higher salaried employees. Those in the streets diverging from the plaza have in general six rooms and are rented for a smaller sum. The architectural treatment of the façades has been made different for each street. Permanent materials of construction have been used throughout; the walls are of brick, the roofs slate, and the porch floors of cement. Each house has a cellar and is provided with water and gas and an independent hot air heating system.

The fronts of the houses are terraced above the


First Floor Plan


Group of Typical Six-Room Houses


Second Floor Plan


Views of Street Façades Showing Different Types of Architectural Treatment

Exterior of Village Store

Plan of Dining Hall

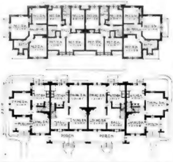
Dining Hall and Recreation Building

street, and rows of trees are planted on each side of the streets. Hedges form the divisions between the front gardens and low iron fences between the rear plots. Separate storm and soil sewers have been provided for the entire property. The streets are macadamized, with cement curbs, gutters, and sidewalks edged with grass plots.

The village store is located at the end of the central street and is operated on the co-operative plan by the company. The boarding houses, one for men and the other for women, are located apart near the center of the village. Opposite the plaza the dining hall and recreation building is located and is intended for public entertainments, social occasions, and general recreational purposes. It is constructed of brick with stone and terra cotta trimmings and is of fireproof construction. A roof garden is provided with a floor of promenade tile.

The two hundred and fifteen dwellings were built at an average cost of $2,300. This includes plumbing, heating, gas piping and fixtures, papering and painting interiors, fences and sidewalks, and also a proportional cost to each house for main and branch sewers, curbs and gutters, macadam roads, and all other expenses except the cost of the unimproved land.

The average number of houses to the acre is thirteen. While the rentals are enough to cover expenses, the sum does not prove a large return on the investment. Returns in the form of contented help have, however, more than repaid the company, and that was its chief object.



First and Second Floor Plans of Typical Eight-Room Houses

Exterior of Eight-Room Houses on Semicircular Plaza

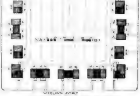
Workingmen's Houses at Massena, N. Y.

ALBERT H. SPAHR, ARCHITECT

AT Massena, N. Y., in the manufacturing community of the Pittsburgh Reduction Company, there has been built in the past few years a group of well constructed dwellings for the housing of the company's employees. Houses to accommodate one hundred and five families have been completed to date at a cost of $218,000, or an average cost per single house of $2,076. This figure includes furnace heat, good sanitary plumbing, electric wiring and fixtures, as well as all construction, finish, and painting. The houses vary in construction, showing different combinations of frame, brick, and stucco on wire lath construction with shingle roofs stained in various colors. The exterior wood finish is stained cypress with sash and frames of painted pine. The interiors are finished in stained cypress and plaster walls treated with water paint. Floors are hard pine, stained and varnished.

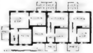
The land occupied by the development is divided into blocks similar to the one shown in plan herewith. The houses are placed on three of the frontages, leaving the fourth side open for convenient access to the open park-space in the center of the block which is divided into garden plots, one being allowed to each householder. The houses are owned by the company and rented to the tenants at a nominal figure. The streets and grounds are kept in order by the company.

The houses show considerable variety in their architectural treatment, and are designed with good regard for scale with one another and pleasing combinations of materials and colors. With the proper accompaniment of vines and growing gardens they will have an equal charm with the recent English industrial housing communities which have pointed the way for a solution of the workingman's home problem.



PLOT PLAN OF TYPICAL BLOCK

FIRST FLOOR PLAN



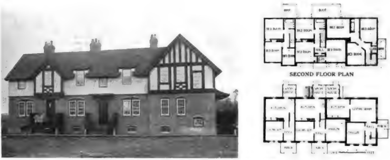
FIRST FLOOR OF HOUSE BELOW

TWO-FAMILY HOUSE

SECOND FLOOR OF HOUSE AT LEFT

SECOND FLOOR OF HOUSE BELOW

EXTERIOR OF A THREE-FAMILY HOUSE



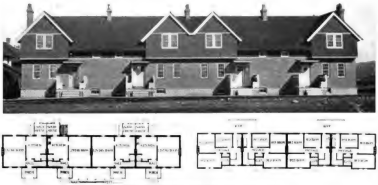
EXTERIOR AND FLOOR PLANS OF A THREE-FAMILY HOUSE

EXTERIOR AND FLOOR PLANS OF A THREE-FAMILY HOUSE

EXTERIOR AND FLOOR PLANS OF A THREE-FAMILY HOUSE

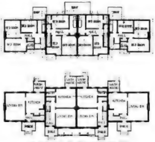
WORKINGMEN'S HOUSES AT MASSENA, N. Y.

ALBERT H. SPAHR, ARCHITECT



EXTERIOR AND FLOOR PLANS OF A FOUR-FAMILY HOUSE

EXTERIOR AND FLOOR PLANS OF A SINGLE HOUSE



FLOOR PLANS OF HOUSE BELOW

EXTERIOR OF A FOUR-FAMILY HOUSE

WORKINGMEN'S HOUSES AT MASSENA, N. Y.
ALBERT H. SPAHR, ARCHITECT

EDITORIAL COMMENT AND NOTES FOR THE MONTH

EFFICIENCY has come to be the watchword in business and manufacturing enterprises to-day, and the ease and celerity with which intricate transactions are carried on under its guidance prove beyond question its value. As a directing force it is steadily creeping into every department of American business. Its call is even now heard in the field of art, at least in one of the arts — the profession of architecture! That haven of the free and untrammeled artistic temperament — the drafting room — must soon bend to the new order. While to some that may sound like the death knell of creative design, it means, on the contrary, a greater opportunity for the appreciation of architecture by the public and a better and more virile expression of the art itself.

It is true, the old contention that because architecture is a creative art it cannot be conducted under exacting business demands is still maintained in many offices, but the success of those architects who have organized their offices on a systematic and efficient basis shows the absurdity of any such belief and points strongly to the fact that further progress of the architectural profession is dependent in a very large measure upon more efficient effort in the transaction of business affairs.

The banker, business man, real estate promoter, and nearly every other client an architect may expect to have looks for efficiency in his associates and systematic execution of detail in his business transactions. Why should he not demand the same of the individual or organization to which he has entrusted the design and construction of a building, representing to him an important business undertaking? It is only reasonable and logical that he should do so, yet architects have been loth to appreciate this viewpoint and have been content to develop one side of their profession — the artistic, to the neglect and detriment of the other, — the business. Surely one is as essential as the other, and no office can be said to be successful that executes architecture of a high order; but in doing so consumes an exorbitant amount of draftsmen's time, makes frequent changes as the work progresses, resulting in a large bill of extras, and finally showing in the architect's balance sheet a net loss to himself, instead of a profit out of commissions.

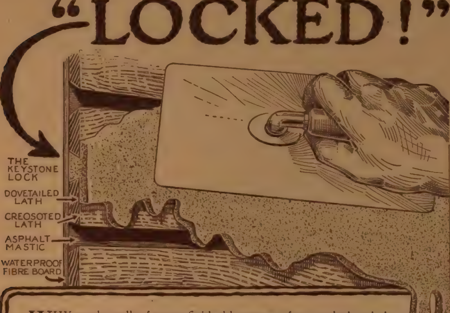
Much criticism has been directed to architects' offices, and in many cases not without reason, because of the inadequate and often contradictory character of specifications. This criticism does not apply to all offices, of course, but it does to a large enough number to make it a matter for serious thought. The condition is due entirely to lack of efficient office methods, and the great saving of time which is now wasted in repeatedly preparing duplicate specifications of a technical nature that could with reasonable study be reduced to standard forms, would be of advantage both to the architect and his client.

It is in the correction of such fundamental errors as those mentioned that efficiency will prove an able ally to the architectural profession. The adoption of efficient business methods does not mean an endless amount of "system" or "red tape" or an extensive group of clerks with varying duties of a non-producing order. It means simply the application of sound, common sense principles which have come to be recognized as essentials to business success, and which architects must recognize if they are to remain in command in the building world. Otherwise the day is not distant when architecture will be represented and created by departments of large contracting and development organizations which elect to recognize first, business qualities, and second, architectural ethics.

BOOK NOTES

MECHANICAL EQUIPMENT OF BUILDINGS. By Louis Allen Harding, B.S., M.E., and Arthur Cutts, S.B., New York, John Wiley & Sons, Inc. 6½ x 9 inches. 615 pages, leather. Price, $4.00 net. This is the first volume of a series of reference books for architects and engineers which will completely cover the field of mechanical equipment of buildings. If the standard set by this volume is maintained for the series, the work will be of practical value in the drafting room. The present volume deals with heating and ventilating and is comprehensively treated with chapters on the various methods of heating and ventilating, the combustion of fuel, correct construction of flues, pipe and valve fittings, heating of water in tanks and pools, cost of equipment, and the preparation of plans and specifications. Numerous diagrams illustrate points of the text, and tables are introduced wherever data can be tabulated. A special practical value has been given to the work by including manufacturers' data and definite descriptions of patented appliances now in general use. This feature of the work is representative, and it is not the intention of the authors to recommend in any way the appliances shown or described.

CITY RESIDENTIAL LAND IMPROVEMENT. Edited by Alfred B. Yeomans. Chicago, University of Chicago Press. 9 x 12 inches. 138 pages, cloth. Price, $3.00 net. This publication of the City Club of Chicago brings together in compact form the plans which were submitted in a competition conducted by that organization early in 1913 for the residential development of a quarter section of land on the outskirts of Chicago. As a contribution to the literature on town planning, it has a special interest because of the small area treated and the practical considerations involved which make the scheme more or less possible of being carried to completion. As will be recalled, a number of drawings were received, and a good many of the architects who have devoted time and study to the town planning movement were represented. Thirty-two of the competitive plans are illustrated in color and each is accompanied by an explanation from its author. The report of the jury of award is included and also a review of the plans by representative architects.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